



LAMPIRAN

Lampiran 1 Data Jumlah Wisatawan Domestik Bulanan Yang Berkunjung Ke Bali Periode Januari 2004 hingga Desember 2023.

Bulan	Tahun								
	2004	2005	2006	2007	2008	2009	2010	2011	2012
Januari	167,106	174,515	202,857	181,266	225,955	264,915	349,575	280,588	333,199
Februari	133,660	161,808	161,413	144,425	190,792	204,419	238,789	340,508	305,934
Maret	118,369	194,411	171,795	161,009	221,181	255,203	202,995	358,313	307,616
April	129,730	174,033	192,182	165,509	206,631	247,100	396,898	385,228	331,378
Mei	142,186	190,855	188,152	183,736	226,339	289,635	421,369	463,452	525,076
Juni	167,718	201,990	204,284	214,957	256,448	304,213	455,456	568,264	569,635
Juli	212,463	254,264	245,909	244,032	329,362	340,610	489,307	573,103	524,334
Agustus	171,034	217,782	218,117	217,822	259,511	280,972	377,570	440,751	661,334
September	168,420	218,382	196,167	181,846	205,304	352,257	594,662	609,633	572,359
Oktober	150,827	168,684	238,721	299,724	306,112	330,337	391,722	526,302	667,703
November	269,132	259,543	234,308	204,579	203,416	285,526	361,395	574,016	545,348
Desember	207,541	192,242	220,882	285,739	267,742	365,948	366,605	554,963	719,642

Bulan	Tahun								
	2013	2014	2015	2016	2017	2018	2019	2020	2021
Januari	426,360	517,500	528,506	597,558	658,308	743,456	793,527	879,702	282,248
Februari	369,525	296,581	483,221	513,852	520,462	655,719	692,113	721,105	240,608
Maret	431,393	255,403	503,311	576,438	618,834	762,622	787,616	567,452	305,579
April	403,211	318,800	528,668	534,395	705,710	777,287	795,997	175,120	330,593
Mei	456,491	385,366	651,089	647,790	646,467	682,521	656,082	101,948	363,959
Juni	785,053	667,201	571,646	1,035,563	659,718	1,156,151	1,287,877	137,395	498,852
Juli	474,769	682,941	799,765	1,084,950	890,368	906,347	935,930	229,112	166,718
Agustus	878,278	843,958	641,684	704,662	790,323	770,364	925,360	355,732	202,187
September	473,697	615,429	557,081	725,240	832,026	774,144	812,003	283,349	298,950
Oktober	758,351	549,998	619,599	685,244	732,720	762,124	853,007	337,304	468,826
November	678,748	468,743	529,381	655,962	741,649	806,397	852,626	425,097	513,482
Desember	840,660	792,387	733,149	882,026	939,048	960,859	1,152,901	382,841	629,590

Bulan	Tahun		
	2022	2023	2024
Januari	527,447	720,164	774,529
Februari	389,690	629,282	726,744
Maret	547,726	665,751	612,742
April	500,740	900,880	1,124,781
Mei	960,692	943,713	852,253
Juni	753,907	883,793	898,355
Juli	784,205	898,260	926,975
Agustus	659,567	712,860	853,713
September	622,068	755,293	856,370
Oktober	718,066	813,745	828,647
November	657,949	749,268	724,560
Desember	930,917	1,204,902	941,137



Lampiran 2 *Package* yang Dibutuhkan

```
> library(ggplot2)
> library(tsibble)
> library(tseries)
> library(MASS)
> library(dplyr)
> library(TTR)
> library(forecast)
> library(lmtest)
> library(HoRM)
> library(dLagM)
> library(dynlm)
> library(MLmetrics)
> library(car)
> library(TSA)
> library(aTSA)
> library(rugarch)
> library(tidyr)
> library(rio)
> library(MLmetrics)
```

Lampiran 3 R Code Untuk *Import Data*

```
>
> datawisata <- import("https://raw.githubusercontent.com/rahboy/data-wisata/refs/heads/main/wisatanew2.csv")
> |
```

Lampiran 4 R Code Hitung Statistik Deskriptif

```
> # Hitung statistik deskriptif dan bulatkan
> Mean <- round(mean(datawisata$Data, na.rm = TRUE))
> Median <- round(median(datawisata$Data, na.rm = TRUE))
> Min <- round(min(datawisata$Data, na.rm = TRUE))
> Max <- round(max(datawisata$Data, na.rm = TRUE))
> Std_Dev <- round(sd(datawisata$Data, na.rm = TRUE))
> Observations <- length(datawisata$Data)
> deskriptif <- data.frame(Mean, Median, Min, Max, Std_Dev, Observations)
> print(deskriptif)
```

	Mean	Median	Min	Max	Std_Dev	Observations
1	505400	499796	101948	1287877	266962	252

Lampiran 5 R Code Plot *Time Series* Data Keseluruhan

```
> #Semua Data
> datawisata.ts <- ts(datawisata$Data, start = c(2004, 1), frequency = 12)
> # Plot Semua Data
> plot(datawisata.ts,
+       main = "Wisatawan Domestik Bali 2004-2024",
+       xlab = "tahun",
+       ylab = "Jumlah Kunjungan",
+       col = "black",
+       type = "o",
+       lwd = 1.5,
+       xaxt = "n")
> # Tambahkan sumbu x manual
> axis(1, at = seq(2004, 2024, by = 1), labels = seq(2004, 2024, by = 1))
```

Lampiran 6 R Code Plot *Time Series Data Training*

```
> #Data Training
> wisatatrain <- datawisata.ts[1:240]
> train.ts <- ts(wisatatrain, start = c(2004, 1), frequency = 12)
> plot(train.ts,
+       main = "Plot Data Training",
+       xlab = "tahun",
+       ylab = "Jumlah Kunjungan",
+       col = "black",
+       type = "o",
+       lwd = 1.5,                # Ketebalan garis
+       xaxt = "n")              # Hilangkan sumbu x default
> # Tambahkan sumbu x manual
> axis(1, at = seq(2004, 2024, by = 1), labels = seq(2004, 2024, by = 1))
> |
```

Lampiran 7 R Code Plot *Time Series Data Testing*

```
> # Tambahkan sumbu x manual
> axis(1, at = seq(2024, 2024, by = 1), labels = seq(2024, 2024, by = 1))
> #Data Testing
> wisatatest <- datawisata.ts[241:252]
> test.ts <- ts(wisatatest, start = c(2024, 1), frequency = 12)
> plot(test.ts,
+       main = "Plot Data Testing",
+       xlab = "tahun",
+       ylab = "Jumlah Kunjungan",
+       col = "black",
+       type = "o",
+       lwd = 1.5,
+       xaxt = "n")
> # Tambahkan sumbu x manual
> axis(1, at = seq(2024, 2024, by = 1), labels = seq(2024, 2024, by = 1))
> |
```

Lampiran 8 R Code Uji *Seasonal dan Trend*

```
> # Tambahkan sumbu x manual
> axis(1, at = seq(2024, 2024, by = 1), labels = seq(2024, 2024, by = 1))
> #uji seasonal dan trend
> seasonplot(datawisata.ts,12,
+            main="Wisatawan Domestik Ke Bali 01/01/2004 - 30/12/2023",
+            xlab = "Bulan",
+            ylab = "Jumlah Kunjungan",
+            year.labels = TRUE, col=rainbow(18))
> |
```

Lampiran 9 R Code Uji Kestasioneran dalam Ragam

```
> #Uji Box-Cox
> index <- seq(1:240)
> bc = boxcox(train.ts~index, lambda = seq(-2, 4, by=.01))
> lambda <- bc$x[which.max(bc$y)]
> lambda
[1] 0.24
> bc$x[bc$y > max(bc$y) - 1/2 * qchisq(.95,1)]
[1] 0.03 0.04 0.05 0.06 0.07 0.08 0.09 0.10 0.11 0.12 0.13 0.14 0.15 0.16 0.17
[16] 0.18 0.19 0.20 0.21 0.22 0.23 0.24 0.25 0.26 0.27 0.28 0.29 0.30 0.31 0.32
[31] 0.33 0.34 0.35 0.36 0.37 0.38 0.39 0.40 0.41 0.42 0.43 0.44
> |
```

Lampiran 10 R Code Tranformasi

```
> #Transformasi
> train.ts.new <- BoxCox(train.ts, lambda = 0.24)
> index <- seq(1:240)
> bc = boxcox(train.ts.new-index, lambda = seq(-2, 4, by=.01))
> lambda <- bc$x[which.max(bc$y)]
> lambda
[1] 0.98
> bc$x[bc$y > max(bc$y) - 1/2 * qchisq(.95,1)]
[1] 0.15 0.16 0.17 0.18 0.19 0.20 0.21 0.22 0.23 0.24 0.25 0.26 0.27 0.28 0.29
[16] 0.30 0.31 0.32 0.33 0.34 0.35 0.36 0.37 0.38 0.39 0.40 0.41 0.42 0.43 0.44
[31] 0.45 0.46 0.47 0.48 0.49 0.50 0.51 0.52 0.53 0.54 0.55 0.56 0.57 0.58 0.59
[46] 0.60 0.61 0.62 0.63 0.64 0.65 0.66 0.67 0.68 0.69 0.70 0.71 0.72 0.73 0.74
[61] 0.75 0.76 0.77 0.78 0.79 0.80 0.81 0.82 0.83 0.84 0.85 0.86 0.87 0.88 0.89
[76] 0.90 0.91 0.92 0.93 0.94 0.95 0.96 0.97 0.98 0.99 1.00 1.01 1.02 1.03 1.04
[91] 1.05 1.06 1.07 1.08 1.09 1.10 1.11 1.12 1.13 1.14 1.15 1.16 1.17 1.18 1.19
[106] 1.20 1.21 1.22 1.23 1.24 1.25 1.26 1.27 1.28 1.29 1.30 1.31 1.32 1.33 1.34
[121] 1.35 1.36 1.37 1.38 1.39 1.40 1.41 1.42 1.43 1.44 1.45 1.46 1.47 1.48 1.49
[136] 1.50 1.51 1.52 1.53 1.54 1.55 1.56 1.57 1.58 1.59 1.60 1.61 1.62 1.63 1.64
[151] 1.65 1.66 1.67 1.68 1.69 1.70 1.71 1.72 1.73 1.74 1.75 1.76 1.77 1.78 1.79
[166] 1.80 1.81
> |
```

Lampiran 11 R Code Uji ADF Sebelum Differencing

```
> #Uji ADF Sebelum Differencing
> tseries::adf.test(train.ts)

Augmented Dickey-Fuller Test

data: train.ts
Dickey-Fuller = -2.9072, Lag order = 6, p-value = 0.1943
alternative hypothesis: stationary
```

Lampiran 12 R Code Uji ADF Sesudah Differencing

```
> tseries::adf.test(train.diff)

Augmented Dickey-Fuller Test

data: train.diff
Dickey-Fuller = -7.5142, Lag order = 6, p-value = 0.01
alternative hypothesis: stationary
```

Lampiran 13 R Code Menampilkan Plot ACF Sebelum Differencing

```
> #Plot ACF Sebelum differencing
> acf(train.ts)
> acf_result <- acf(train.ts, lag.max = 15, plot = TRUE)
> acf_result$acf
, , 1

[,1]
[1,] 0.8276785
[2,] 0.7755232
[3,] 0.6960473
[4,] 0.6559808
[5,] 0.6525846
[6,] 0.6601427
[7,] 0.6162514
[8,] 0.5764895
[9,] 0.5540059
[10,] 0.5455298
[11,] 0.5703350
[12,] 0.6239691
[13,] 0.5375687
[14,] 0.5072035
[15,] 0.4468866
```


Lampiran 14 R Code Menampilkan Plot ACF Sesudah *Differencing*

```
> #Plot ACF Sesudah differencing
> acf(train.diff)
> acf_result <- acf(train.diff, lag.max = 15, plot = TRUE)
> acf_result$acf
, , 1

      [,1]
[1,] -0.242195063
[2,]  0.046833517
[3,] -0.136127022
[4,] -0.142579551
[5,] -0.034444812
[6,]  0.076661683
[7,]  0.012210545
[8,] -0.049794212
[9,] -0.018493697
[10,] -0.065855002
[11,] -0.111735806
[12,]  0.368196982
[13,] -0.105796430
[14,]  0.099338231
[15,] -0.008069766
```

Lampiran 15 R Code Menampilkan Plot PACF Sebelum *Differencing*

```
> #Plot PACF Sebelum differencing
> Pacf(train.ts)
> Pacf_result <- Pacf(train.ts, lag.max = 15, plot = TRUE)
> Pacf_result$acf
, , 1

      [,1]
[1,]  0.827678469
[2,]  0.287258440
[3,]  0.002742276
[4,]  0.076570203
[5,]  0.181534407
[6,]  0.154482189
[7,] -0.090105135
[8,] -0.060604256
[9,]  0.080689196
[10,]  0.091091799
[11,]  0.120673811
[12,]  0.212184954
[13,] -0.315818198
[14,] -0.076886940
[15,] -0.001258482
```

Lampiran 16 R Code Menampilkan Plot PACF Sesudah *Differencing*

```
> # Menampilkan nilai PACF Sesudah differencing
> pacf(train.diff)
> pacf_result <- pacf(train.diff, lag.max = 15, plot = FALSE)
> pacf_result$acf # Nilai PACF-nya
, , 1

      [,1]
[1,] -0.242195063
[2,] -0.012561787
[3,] -0.135661963
[4,] -0.223954612
[5,] -0.144631129
[6,]  0.004999786
[7,] -0.026956327
[8,] -0.129270461
[9,] -0.095864452
[10,] -0.104300138
[11,] -0.223724945
[12,]  0.260353079
[13,]  0.009377726
[14,]  0.012275487
[15,]  0.092312409
```


Lampiran 17 R Code Untuk Input Model ARIMA (2,1,4) dan Output Uji Koefisien

```
> model1.da=Arima(train.diff, order=c(2,1,4),method="ML")
> summary(model1.da)
Series: train.diff
ARIMA(2,1,4)

Coefficients:
      ar1      ar2      ma1      ma2      ma3      ma4
    0.8251 -0.5652 -2.1678  2.0242 -1.2629  0.4065
s.e.  0.1808  0.2478  0.1926  0.4971  0.4046  0.0971

sigma^2 = 32.15: log likelihood = -751.65
AIC=1517.29 AICc=1517.78 BIC=1541.6

Training set error measures:
              ME      RMSE      MAE      MPE      MAPE      MASE
Training set -0.02985753 5.586736 4.095132 74.60074 124.1359 0.5608636
              ACF1
Training set 0.006427565
> lmtest::coeftest(model1.da)

z test of coefficients:

      Estimate Std. Error z value Pr(>|z|)
ar1  0.82509    0.18083   4.5628 5.048e-06 ***
ar2 -0.56523    0.24782  -2.2808 0.022561 *
ma1 -2.16779    0.19257 -11.2572 < 2.2e-16 ***
ma2  2.02419    0.49714   4.0717 4.668e-05 ***
ma3 -1.26290    0.40464  -3.1210 0.001802 **
ma4  0.40651    0.09706   4.1882 2.812e-05 ***
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

Lampiran 18 R Code Untuk Input Model ARIMA (1,1,4) dan Output Uji Koefisien

```
> model2.da=Arima(train.diff, order=c(1,1,4),method="ML")
> summary(model2.da)
Series: train.diff
ARIMA(1,1,4)

Coefficients:
      ar1      ma1      ma2      ma3      ma4
    0.3582 -1.7006  0.8462 -0.3796  0.2339
s.e.  0.1548  0.1493  0.2258  0.1477  0.0737

sigma^2 = 32.56: log likelihood = -753.74
AIC=1519.49 AICc=1519.85 BIC=1540.32

Training set error measures:
              ME      RMSE      MAE      MPE      MAPE      MASE
Training set -0.02819104 5.634313 4.115908 95.51306 140.8284 0.563709
              ACF1
Training set 0.00684164
> lmtest::coeftest(model2.da)

z test of coefficients:

      Estimate Std. Error z value Pr(>|z|)
ar1  0.358215    0.154785   2.3143 0.0206526 *
ma1 -1.700558    0.149332 -11.3878 < 2.2e-16 ***
ma2  0.846192    0.225764   3.7481 0.0001782 ***
ma3 -0.379551    0.147682  -2.5701 0.0101682 *
ma4  0.233925    0.073651   3.1761 0.0014926 **
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

Lampiran 19 R Code Untuk *Input* Model ARIMA (2,1,3) dan *Output* Uji Koefisien

```
> model3.da=Arima(train.diff, order=c(2,1,3),method="ML")
> summary(model3.da)
Series: train.diff
ARIMA(2,1,3)

Coefficients:
      ar1      ar2      ma1      ma2      ma3
    -0.3578  0.5555 -0.9563 -0.8263  0.7826
s.e.   0.1261  0.0909  0.1181  0.1817  0.0948

sigma^2 = 33.24:  log likelihood = -756.2
AIC=1524.39  AICc=1524.76  BIC=1545.23

Training set error measures:
              ME      RMSE      MAE      MPE      MAPE      MASE
Training set -0.03843652  5.692644  4.216456  58.43983  141.0089  0.5774799
              ACF1
Training set -0.01114408
> lmtest::coeftest(model3.da)

z test of coefficients:

      Estimate Std. Error z value Pr(>|z|)
ar1 -0.357838   0.126119  -2.8373   0.00455 **
ar2  0.555462   0.090881   6.1120  9.841e-10 ***
ma1 -0.956324   0.118078  -8.0991  5.539e-16 ***
ma2 -0.826275   0.181716  -4.5471  5.440e-06 ***
ma3  0.782605   0.094783   8.2568 < 2.2e-16 ***
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

Lampiran 20 R Code Untuk *Input* Model ARIMA (1,1,2) dan *Output* Uji Koefisien

```
> model4.da=Arima(train.diff, order=c(1,1,2),method="ML")
> summary(model4.da)
Series: train.diff
ARIMA(1,1,2)

Coefficients:
      ar1      ma1      ma2
    0.5471 -1.8491  0.8491
s.e.   0.0890  0.0590  0.0584

sigma^2 = 33.41:  log likelihood = -757.77
AIC=1523.54  AICc=1523.71  BIC=1537.42

Training set error measures:
              ME      RMSE      MAE      MPE      MAPE      MASE
Training set -0.03435792  5.73184  4.178242  93.28605  138.4159  0.5722462
              ACF1
Training set -0.0339427
> lmtest::coeftest(model4.da)

z test of coefficients:

      Estimate Std. Error z value Pr(>|z|)
ar1  0.547079   0.089029   6.1449   8e-10 ***
ma1 -1.849132   0.058973  -31.3553 <2e-16 ***
ma2  0.849140   0.058416  14.5361 <2e-16 ***
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

Lampiran 21 R Code Untuk *Fitted* Model ARIMA(2,1,4)

#Menghitung Residual model

```
> fitted_values <- fitted(model1.da)
> min_len <- length(fitted_values)
> # Ambil hanya data aktual sebanyak panjang fitted
```

```

> data_aktual <- tail(train.diff, min_len)
> # Buat tabel perbandingan
> perbandingan_training <- data.frame(
+   Aktual = as.numeric(data_aktual),
+   Fitted = as.numeric(fitted_values),
+   Residual = as.numeric(data_aktual - fitted_values)
+ )
> # Lihat hasilnya
head(perbandingan_training, 240)

```

	Aktual	Fitted	Residual
1	-3.89831098	-3.89441267	-0.003898305
2	-2.03457274	-3.10845628	1.073883535
3	1.52928188	-1.94489843	3.474180301
4	1.56384719	-1.10391755	2.667764744
5	2.90531994	0.33389463	2.571425302
6	4.36599616	0.64682674	3.719169420
7	-4.01387155	-1.01447983	-2.999391716
8	-0.27714089	0.13436079	-0.411501688
9	-1.95560304	-1.18429307	-0.771309970
10	10.86657568	1.19752001	9.669055667
11	-5.06383971	-1.18009658	-3.883743126
12	-3.20588479	2.70461163	-5.910496422
13	-1.35715397	0.26607030	-1.623224273
14	3.33848322	-0.63077363	3.969256855
15	-2.03141457	-0.01975863	-2.011655933
16	1.68898230	2.95217342	-1.263191121
17	1.05667807	0.97211476	0.084563312
18	4.43965494	-0.08585349	4.525508435
19	-3.01448451	-1.36085670	-1.653627813
20	0.05257755	1.00236205	-0.949784497
21	-4.78643363	-0.22562453	-4.560809099
22	8.15678848	1.52949562	6.627292865
23	-5.77064475	-1.61295396	-4.157690790
24	1.00294287	3.07972482	-2.076781952
25	-4.17659705	0.39982464	-4.576421695
26	1.11659102	1.28302518	-0.166434163
27	2.05127584	0.53730883	1.513967005
28	-0.39189814	1.07815780	-1.470055937
29	1.53239388	1.70401564	-0.171621757
30	3.56766933	0.02046502	3.547204306
31	-2.32529605	-1.46529015	-0.860005904
32	-2.00144113	0.27501034	-2.276451468
33	3.74530329	0.35196122	3.393342071
34	-0.36358876	-1.15422503	0.790636270
35	-1.13916659	0.61420605	-1.753372633
36	-3.70052575	0.70643596	-4.406961718
37	-4.04228719	0.93201316	-4.974300348

38	1.90642908	1.54519516	0.361233914
39	0.49141033	1.00331668	-0.511906344
40	1.89226974	2.28128077	-0.389011028
41	2.93318505	1.23938548	1.693799565
42	2.45313771	-0.63092980	3.084067506
43	-2.20058655	-1.52872838	-0.671858170
44	-3.37513567	-0.40452188	-2.970613790
45	9.71275083	0.30010326	9.412647570
46	-7.52697543	-3.22596329	-4.301012145
47	6.54703215	2.71333255	3.833699600
48	-4.65424194	-2.16082774	-2.493414194
49	-3.19489731	0.44819338	-3.643090688
50	2.78436993	0.68382165	2.100548278
51	-1.29421247	-0.36162788	-0.932584590
52	1.73747349	1.80890010	-0.071426608
53	2.44456765	0.72693718	1.717630470
54	5.12398724	-0.48061044	5.604597677
55	-4.88775147	-2.06761548	-2.820135987
56	-4.53972339	0.54210615	-5.081829536
57	7.89645400	0.44404990	7.452404094
58	-8.07027537	-2.72696308	-5.343312293
59	5.33803336	3.65823974	1.679793617
60	-0.21281936	-0.44100338	0.228184026
61	-5.03271946	0.20620843	-5.238927885
62	4.28817986	1.71192806	2.576251803
63	-0.63785189	-1.08280803	0.444956144
64	3.18802192	0.97798659	2.210035338
65	1.01052224	-0.10991716	1.120439399
66	2.37127793	-0.41038077	2.781658698
67	-4.00075255	-1.66669230	-2.334060242
68	4.71876227	0.17597241	4.542789864
69	-1.36697243	-2.10340263	0.736430194
70	-3.02463654	0.30462249	-3.329259031
71	5.21291375	1.12771896	4.085194795
72	-0.98502631	-1.73580734	0.750781028
73	-7.79506969	0.30551812	-8.100587809
74	-3.11079015	2.64777365	-5.758563791
75	13.66487506	1.50600004	12.158875027
76	1.32959970	-2.62375562	3.953355322
77	1.75753575	1.66568931	0.091846435
78	1.64904791	-0.74591287	2.394960787
79	-5.83111596	-3.77845189	-2.052664071
80	10.46284647	-1.08849651	11.551342982
81	-9.65708952	-4.08765322	-5.569436301
82	-1.75531024	3.48888580	-5.244196040
83	0.30931831	0.86300936	-0.553691047
84	-5.60665822	-0.21069981	-5.395958406
85	4.02215244	3.29192879	0.730223653

86	1.09061012	1.39288633	-0.302276216
87	1.57294078	1.93491702	-0.361976239
88	4.14097675	0.72288517	3.418091577
89	4.78510559	-1.44472152	6.229827109
90	0.20412534	-2.38446675	2.588592093
91	-6.13244276	-1.43624487	-4.696197894
92	7.63257701	0.22210946	7.410467550
93	-3.53218079	-3.74156051	0.209379722
94	2.07041296	0.97921819	1.091194764
95	-0.81046168	-0.18027859	-0.630183094
96	-11.48193488	-0.11261952	-11.369315363
97	-1.78778496	3.40497886	-5.192763819
98	0.11372175	1.73650312	-1.622781368
99	1.55819640	3.28626976	-1.728073368
100	10.28280303	4.12257925	6.160223783
101	1.94093568	-0.23237722	2.173312906
102	-1.97429894	-0.61201726	-1.362281677
103	5.63107259	-1.56636286	7.197435446
104	-3.54191441	-4.48888299	0.946968585
105	3.78122840	-0.28860840	4.069836799
106	-4.93907429	-1.54336452	-3.395709775
107	6.82859631	1.06811329	5.760483022
108	-12.52000111	-2.68959383	-9.830407281
109	-3.15680080	3.72798580	-6.884786596
110	3.42059045	1.92318686	1.497403589
111	-1.50848120	1.09309143	-2.601572627
112	2.79006958	4.07464284	-1.284573257
113	13.21208599	2.02535218	11.186733810
114	-12.31206041	-3.63063307	-8.681427344
115	15.26786634	2.81593231	12.451934034
116	-15.31991879	-6.77565393	-8.544264862
117	11.46851910	3.07979148	8.388727620
118	-2.82045894	-3.82273161	1.002272665
119	5.50926721	0.87597805	4.633289152
120	-12.09956936	-1.64214150	-10.457427860
121	-12.25355684	2.77894055	-15.032497384
122	-3.02081376	3.55225882	-6.573072587
123	4.52009839	3.59468006	0.925418331
124	4.06135152	4.93929944	-0.877947923
125	12.85349119	5.43149740	7.421993793
126	0.58440282	-1.32314718	1.907549997
127	5.45808469	-2.11790593	7.575990622
128	-8.04179010	-5.87906779	-2.162722303
129	-2.71858721	-1.32627347	-1.392313746
130	-3.74215652	-0.84494080	-2.897215714
131	12.84775616	1.70926663	11.138489530
132	-10.05217141	-2.05138097	-8.000790438
133	-2.09451349	4.62206166	-6.716575146

134	0.94684392	0.57573058	0.371113339
135	1.15491303	-0.82635239	1.981265427
136	5.04804826	1.30734130	3.740706959
137	-3.18328305	0.83622274	-4.019505790
138	8.42182859	1.78477346	6.637055129
139	-5.59944795	-3.79605524	-1.803392707
140	-3.44202404	0.18042170	-3.622445745
141	2.57846436	0.47921918	2.099245185
142	-3.79172600	-0.60328573	-3.188440275
143	8.00800400	2.56825803	5.439745973
144	-5.10176549	-1.03101658	-4.070748903
145	-3.60765819	2.09521160	-5.702869786
146	2.73556796	1.01952303	1.716044932
147	-1.81101563	-0.79960147	-1.011414165
148	4.66691524	2.07039262	2.596522617
149	12.32308737	0.47200067	11.851086696
150	1.30122638	-3.47870597	4.779932346
151	-11.51471426	-2.22550642	-9.289207843
152	0.73143080	0.05963172	0.671799083
153	-1.43667134	-3.39215972	1.955488383
154	-1.09278096	0.61916669	-1.711947651
155	7.63906835	3.48805392	4.151014429
156	-7.55016649	-0.03456846	-7.515598034
157	-5.69144194	2.60085837	-8.292300303
158	4.16231099	1.28262702	2.879683962
159	3.27589067	-0.60430310	3.880193773
160	-2.19796282	1.78957120	-3.987534028
161	0.50451938	3.28208069	-2.777561312
162	7.74870449	0.08003142	7.668673071
163	-3.14739290	-3.44626810	0.298875208
164	1.34680410	0.52560298	0.821201120
165	-3.29891833	-0.76942198	-2.529496343
166	0.31006194	0.20469070	0.105371241
167	6.22442060	-0.32711196	6.551532561
168	-6.16201757	-1.41903380	-4.742983775
169	-3.17310277	2.63895253	-5.812055305
170	3.82798905	1.08648415	2.741504902
171	0.49269415	-1.14519657	1.637890720
172	-3.31878638	1.17534387	-4.494130246
173	14.11899831	2.70011359	11.418884719
174	-6.74329144	-4.15410815	-2.589183295
175	-4.28862131	1.22191249	-5.510533794
176	0.12670526	0.01173143	0.114973829
177	-0.40455566	-1.11976044	0.715204775
178	1.46698696	1.24648842	0.220498532
179	4.68164826	1.90982930	2.771818963
180	-5.10165098	-0.15757813	-4.944072843
181	-3.50492236	1.33553708	-4.840459438

182	3.31028462	0.43492321	2.875361410
183	0.27564370	-0.63377840	0.909422101
184	-4.92534661	1.84939326	-6.774739861
185	18.22439507	3.47926531	14.745129757
186	-8.99324522	-5.40574216	-3.587503055
187	-0.30746964	1.98746130	-2.294930939
188	-3.47798091	-1.39468316	-2.083297746
189	1.29834752	-0.62087037	1.919217886
190	-0.01184335	0.09555370	-0.107397058
191	8.29466393	2.03840019	6.256263741
192	-7.46283875	-1.17637641	-6.286462338
193	-5.18482723	2.02440198	-7.209229211
194	-5.92966017	0.55871641	-6.488376583
195	-24.62648418	2.04757789	-26.674062066
196	-9.19845553	11.56817156	-20.766627085
197	4.92548922	10.40359361	-5.478104394
198	9.30580292	8.74358923	0.562213692
199	8.97350300	8.02276735	0.950735654
200	-4.75822994	3.76989017	-8.528120100
201	3.62229078	1.58895880	2.033331979
202	5.04747403	-4.31386285	9.361336875
203	-2.31915090	-3.54776553	1.228614630
204	-6.42980295	1.03289163	-7.462694577
205	-3.18374873	2.00882680	-5.192575530
206	4.81394212	0.23345593	4.580486184
207	1.64588339	-0.93942417	2.585307558
208	2.05406872	1.70088285	0.353185867
209	7.07728542	0.77716969	6.300115735
210	-22.46252864	-3.40516902	-19.057359625
211	3.53732602	4.99246148	-1.455135460
212	7.69468626	-1.50416084	9.198847096
213	9.79430595	0.16426425	9.630041692
214	2.11229532	1.02090033	1.091394986
215	4.90356767	-0.47787872	5.381446393
216	-4.27173639	-6.32702191	2.055285522
217	-6.89685584	-4.46454800	-2.432307838
218	7.79209740	-0.77201954	8.564116935
219	-2.11506912	-2.50479213	0.389723013
220	16.45375280	1.82878902	14.624963777
221	-6.42325142	-5.34200342	-1.081247995
222	1.01888104	-0.87110168	1.889982722
223	-4.40492041	-4.49198548	0.087065068
224	-1.44872009	-2.15357515	0.704855058
225	3.58847710	-0.11102761	3.699504702
226	-2.20095638	0.13019693	-2.331153310
227	9.01489816	1.87718428	7.137713874
228	-6.73970161	-3.04220583	-3.697495782
229	-3.37895524	0.81454438	-4.193499627

230	1.39781604	-0.04008154	1.437897585
231	7.83637998	-0.58422712	8.420607095
232	1.25466876	-1.10161751	2.356286272
233	-1.76785253	0.59470013	-2.362552661
234	0.43497870	-0.69153053	1.126509231
235	-6.03621091	-2.82702015	-3.209190752
236	1.47849969	0.55599737	0.922502324
237	1.93657885	0.46581177	1.470767080
238	-2.14259912	1.24432412	-3.386923236
239	12.93157419	2.10940424	10.822169946

Lampiran 22 R Code Uji Diagnosis Model ARIMA (2,1,4)

```
> #Diagnosis Model
> sisaan.da <- model1.da$residuals
> tsdiag(model1.da)
> par(mfrow=c(2,2))
> #Diagnosis Model
> sisaan.da <- model1.da$residuals
> tsdiag(model1.da)
> par(mfrow=c(2,2))
> qqnorm(sisaan.da)
> qqline(sisaan.da, col = "blue", lwd = 2)
> plot(c(1:length(sisaan.da)),sisaan.da)
> acf(sisaan.da)
> pacf(sisaan.da)
```

Lampiran 23 R Code dan Output Uji Ljung – Box Model ARIMA (2,1,4)

```
> Box.test(sisaan.da, type = "Ljung") #tak tolak H0 > sisaan saling bebas
```

Box-Ljung test

```
data: sisaan.da
X-squared = 0.0099984, df = 1, p-value = 0.9204
```

Lampiran 24 R Code dan Output Uji Kolmogorov – Smirnov Model ARIMA (2,1,4)

```
> lillie.test(sisaan.da)
```

Lilliefors (Kolmogorov-Smirnov) normality test

```
data: sisaan.da
D = 0.067323, p-value = 0.0106
```

Lampiran 25 R Code dan Output Uji Ljung – Box Untuk Uji Homoskedastisitas Pada model ARIMA (2,1,4)

```
> Box.test((sisaan.da)^2, type = "Ljung") #tak tolak H0 > sisaan homogen
```

Box-Ljung test

```
data: (sisaan.da)^2
X-squared = 20.698, df = 1, p-value = 5.376e-06
```

Lampiran 26 R Code Uji ARCH-LM Pada Model ARIMA (2,1,4)

```
> #UJI ARCH-LM
> for (i in 1:15) {
+   arch_test <- ArchTest(sisaan.da, lags = i, demean = TRUE)
+   cat("P Value LM Test lag ke", i, "adalah", arch_test$p.value, "\n")
+ }
P Value LM Test lag ke 1 adalah 6.806961e-06
P Value LM Test lag ke 2 adalah 3.138179e-05
P Value LM Test lag ke 3 adalah 9.877218e-05
P Value LM Test lag ke 4 adalah 0.0002777985
P Value LM Test lag ke 5 adalah 0.0007263779
P Value LM Test lag ke 6 adalah 0.001741223
P Value LM Test lag ke 7 adalah 0.003311596
P Value LM Test lag ke 8 adalah 0.00663754
P Value LM Test lag ke 9 adalah 0.009583091
P Value LM Test lag ke 10 adalah 0.0003026219
P Value LM Test lag ke 11 adalah 0.0005239554
P Value LM Test lag ke 12 adalah 0.0009162023
P Value LM Test lag ke 13 adalah 0.00171572
P Value LM Test lag ke 14 adalah 0.001302725
P Value LM Test lag ke 15 adalah 0.001331698
```

Lampiran 27 R Code Estimasi Model ARIMA(2,1,4)-GARCH(1,0)

```
> garch11 <- rugarch::ugarchspec(mean.model = list(armaOrder = c(2,4),
include.mean = FALSE),variance.model = list(model = "sgARCH",garchOrder
=c(1,0)))
> garch11 <- rugarch::ugarchfit(data = train.diff, spec = garch11)
> garch11
```

Optimal Parameters

	Estimate	Std. Error	t value	Pr(> t)
ar1	0.956310	0.000219	4369.8905	0.000000
ar2	-0.966802	0.000375	-2575.2683	0.000000
ma1	-1.289750	0.000094	-13788.7589	0.000000
ma2	1.210098	0.000072	16715.3839	0.000000
ma3	-0.286152	0.000067	-4271.9349	0.000000
ma4	-0.109065	0.000155	-701.4744	0.000000
omega	0.037412	0.012057	3.1029	0.001916
alpha1	0.999000	0.030170	33.1124	0.000000

Lampiran 28 R Code Pendugaan Model ARIMA(2,1,4)-GARCH(0,1)

```
> garch12 <- rugarch::ugarchspec(mean.model = list(armaOrder = c(2,4),
include.mean = FALSE),variance.model = list(model = "sgARCH",garchOrder
=c(0,1)))
> garch12 <- rugarch::ugarchfit(data = train.diff, spec = garch12)
> garch12
```

Optimal Parameters

	Estimate	Std. Error	t value	Pr(> t)
ar1	0.914863	0.069152	13.2297	0.000000
ar2	-0.875516	0.073439	-11.9217	0.000000
ma1	-1.275810	0.081546	-15.6452	0.000000
ma2	1.163156	0.117963	9.8603	0.000000
ma3	-0.371348	0.089956	-4.1281	0.000037
ma4	-0.097652	0.072617	-1.3448	0.178703
omega	0.075888	0.030052	2.5252	0.011563
beta1	0.999000	0.000881	1133.9244	0.000000

Lampiran 29 R Code Pendugaan Model ARIMA(2,1,4)-GARCH(1,2)

```
> garch13 <- rugarch::ugarchspec(mean.model = list(armaOrder = c(2,4),
include.mean = FALSE),variance.model = list(model = "sGARCH",garchOrder
=c(1,2)))
> garch13 <- rugarch::ugarchfit(data = train.diff, spec = garch13)
> garch13
```

Optimal Parameters

	Estimate	Std. Error	t value	Pr(> t)
ar1	0.828375	0.060171	13.767079	0.000000
ar2	-0.868742	0.036492	-23.806135	0.000000
ma1	-1.352018	0.033426	-40.447949	0.000000
ma2	1.294842	0.003800	340.717829	0.000000
ma3	-0.477484	0.013096	-36.460203	0.000000
ma4	-0.101063	0.028758	-3.514283	0.000441
omega	17.572545	4.412530	3.982420	0.000068
alpha1	0.553856	0.221393	2.501688	0.012360
beta1	0.000004	0.184796	0.000019	0.999985
beta2	0.001028	0.058028	0.017724	0.985859

Lampiran 30 R Code Pendugaan Model ARIMA(2,1,4)-GARCH(1,1)

```
> garch14 <- rugarch::ugarchspec(mean.model = list(armaOrder = c(2,4), include.mean =
FALSE),variance.model = list(model = "sGARCH",garchOrder=c(1,1)))
> garch14 <- rugarch::ugarchfit(data = train.diff, spec = garch14)
> garch14
```

Optimal Parameters

	Estimate	Std. Error	t value	Pr(> t)
ar1	0.82871	0.056484	14.671650	0.000000
ar2	-0.86873	0.033748	-25.741991	0.000000
ma1	-1.35228	0.037320	-36.234773	0.000000
ma2	1.29475	0.005758	224.869648	0.000000
ma3	-0.47753	0.011259	-42.412420	0.000000
ma4	-0.10114	0.027024	-3.742645	0.000182
omega	17.61330	4.411165	3.992891	0.000065
alpha1	0.55353	0.214967	2.574952	0.010025
beta1	0.00000	0.174596	0.000001	0.999999

Lampiran 31 R Code Peramalan Menggunakan Model ARIMA(2,1,4)-GARCH(1,0)

```
> forc<- ugarchforecast(fit0Rspec = garch11, n.ahead = 12, n.roll = 0)
> plot(forc, which= 1)
> pt_1 <- train.ts.new[240] #nilai akhir data latih
> hasil.forc.Diff <- forc@forecast$seriesFor[,1]
> hasilgarch <- diffinv(hasil.forc.Diff, differences = 1) + pt_1
> hasil1 <- InvBoxCox(hasilgarch, lambda = 0.24)
> hasil1_rounded <- round(hasil1)
> perbandingan <- data.frame("Aktual"= test.ts,
+                             "Ramalan" = hasil1_rounded[-1])
> head(perbandingan,12)
```

	Aktual	Ramalan
1	774529	1018323
2	726744	870244
3	612742	819594
4	1124781	870210
5	852253	974230
6	898335	1024428
7	926975	965671
8	853713	867483
9	856370	829224
10	828647	882544
11	724560	976445
12	941137	1013246

Lampiran 32 R Code Akurasi Peramalan dari Model ARIMA(2,1,4)-GARCH(1,0)

```
> Periode <- time(test.ts)
> dataframe <- data.frame(Periode, perbandingan)
> T <- nrow(dataframe)
> MAPE <- mean(abs((dataframe$Aktual - dataframe$Ramalan) / dataframe$Aktual), na.rm
= TRUE) * 100
> MAPE
[1] 16.1541
> # Hitung MAE
> MAE <- mean(abs(dataframe$Aktual - dataframe$Ramalan), na.rm = TRUE)
> round(MAE)
[1] 129524
```

Lampiran 33 R Code Untuk Uji ARCH-LM Terhadap Model ARIMA(2,1,4)-GARCH(1,0)

```
> for (i in 1:15) { # 10 cukup, tidak perlu sampai 36
+   arch_test <- ArchTest(sisaan, lags = i, demean = TRUE)
+   cat("P Value LM Test lag ke", i, "adalah", arch_test$p.value, "\n")
+ }
P Value LM Test lag ke 1 adalah 0.8189089
P Value LM Test lag ke 2 adalah 0.950802
P Value LM Test lag ke 3 adalah 0.9870152
P Value LM Test lag ke 4 adalah 0.9956215
P Value LM Test lag ke 5 adalah 0.998544
P Value LM Test lag ke 6 adalah 0.9994701
P Value LM Test lag ke 7 adalah 0.9998179
P Value LM Test lag ke 8 adalah 0.9999498
P Value LM Test lag ke 9 adalah 0.9999802
P Value LM Test lag ke 10 adalah 0.9999988
P Value LM Test lag ke 11 adalah 0.9999997
P Value LM Test lag ke 12 adalah 0.9999999
P Value LM Test lag ke 13 adalah 1
P Value LM Test lag ke 14 adalah 1
P Value LM Test lag ke 15 adalah 1
```

Lampiran 34 R Code dan Output Uji Ljung – Box Untuk Uji Homogen Pada Model ARIMA (2,1,4)-GARCH(1,0)

```
> Box.test((sisaan)^2, type = "Ljung") #tak tolak H0 > sisaan homogen
```

Box-Ljung test

```
data: (sisaan)^2
X-squared = 0.056973, df = 1, p-value = 0.8113
```

Lampiran 35 R Code dan Output Hasil Peramalan 2024, 2025 dan 2026

```
> forc_24 <- ugarchforecast(fitORspec = garch11, n.ahead = 60, n.roll = 0)
> # Forecast 36 bulan ke depan
> forc_36 <- ugarchforecast(fitORspec = garch11, n.ahead = 36)
> # Ambil hasil forecast differenced
> hasil_diff_36 <- forc_36@forecast$seriesFor[,1]
> # Inverse differencing: balik ke skala BoxCox
> pt_1_36 <- train.ts.new[240] # titik terakhir data latih
> hasil_inv_diff_36 <- diffinv(hasil_diff_36, differences = 1) + pt_1_36
> # Inverse Box-Cox: balik ke skala asli
> hasil_real_36 <- InvBoxCox(hasil_inv_diff_36[-1], lambda = 0.24)
> # Buat dataframe hasil forecast 36 bulan ke depan TANPA tahun
> hasil_forecast_36 <- data.frame(
+   Periode = paste0("Bulan_", 1:36),
+   Ramalan = round(hasil_real_36, 0)
+ )
```

Peramalan 2024, 2025 dan 2026

```
> print(hasil_forecast_36)
```

	Periode	Ramalan
1	Bulan_1	1018323
2	Bulan_2	870244
3	Bulan_3	819594
4	Bulan_4	870210
5	Bulan_5	974230
6	Bulan_6	1024428
7	Bulan_7	965671
8	Bulan_8	867483
9	Bulan_9	829224
10	Bulan_10	882544
11	Bulan_11	976445
12	Bulan_12	1013246
13	Bulan_13	953340
14	Bulan_14	866127
15	Bulan_15	838682
16	Bulan_16	893365
17	Bulan_17	977260
18	Bulan_18	1002525
19	Bulan_19	942783
20	Bulan_20	865939
21	Bulan_21	847843


```

22 Bulan_22 902742
23 Bulan_23 976915
24 Bulan_24 992371
25 Bulan_25 933837
26 Bulan_26 866707
27 Bulan_27 856607
28 Bulan_28 910759
29 Bulan_29 975629
30 Bulan_30 982860
31 Bulan_31 926345
32 Bulan_32 868245
33 Bulan_33 864898
34 Bulan_34 917512
35 Bulan_35 973600
36 Bulan_36 974039

```

Lampiran 36 R Code Untuk Uji Estimasi Model GARCH(0,1) Tanpa ARIMA

```

> # Spesifikasi model GARCH(0,1)
> garch01 <- ugarchspec(
+   variance.model = list(model = "sGARCH", garchOrder = c(0,1)),
+   mean.model = list(armaOrder = c(0,0), include.mean = TRUE),
+   distribution.model = "norm"
+ )
> fit_garch01 <- ugarchfit(spec = garch01, data = train.diff)
> fit_garch01

```

Optimal Parameters

	Estimate	Std. Error	t value	Pr(> t)
mu	0.187291	0.390879	0.47915	0.631829
omega	0.081931	0.035721	2.29361	0.021813
beta1	0.999000	0.000875	1141.32530	0.000000

Lampiran 37 R Code Untuk Uji Estimasi Model GARCH(1,0) Tanpa ARIMA

```

> # Spesifikasi model GARCH(1,0)
> garch10 <- ugarchspec(
+   variance.model = list(model = "sGARCH", garchOrder = c(1,0)),
+   mean.model = list(armaOrder = c(0,0), include.mean = TRUE),
+   distribution.model = "std"
+ )
> fit_garch10 <- ugarchfit(spec = garch10, data = train.diff)
> fit_garch10

```

Optimal Parameters

	Estimate	Std. Error	t value	Pr(> t)
mu	0.43762	0.33320	1.3134	0.189051
omega	25.86817	4.74640	5.4501	0.000000
alpha1	0.37101	0.17171	2.1607	0.030719
shape	6.75089	2.73004	2.4728	0.013405

Lampiran 38 R Code Untuk Uji Estimasi Model GARCH(1,1) Tanpa ARIMA

```
> # Spesifikasi model GARCH(1,1)
> garch11 <- ugarchspec(
+   variance.model = list(model = "sGARCH", garchOrder = c(1,1)),
+   mean.model = list(armaOrder = c(0,0), include.mean = TRUE),
+   distribution.model = "norm"
+ )
> fit_garch11 <- ugarchfit(spec = garch11, data = train.diff)
> fit_garch11
```

Optimal Parameters

```
-----
      Estimate Std. Error t value Pr(>|t|)
mu      0.267304   0.365951  0.73044 0.465123
omega    1.091002   1.045597  1.04343 0.296752
alpha1   0.055014   0.026807  2.05226 0.040145
beta1    0.919869   0.041221 22.31560 0.000000
```

Lampiran 39 R Code Untuk Uji ARCH-LM Model GARCH(0,1) Tanpa ARIMA

```
> sisaan <- residuals(fit_garch01, standardize = TRUE)
> # Uji ARCH-LM
> for (i in 1:15) {
+   arch_test <- ArchTest(sisaan, lags = i, demean = TRUE)
+   cat("P Value LM Test lag ke", i, "=", arch_test$p.value, "\n")
+ }
```

```
P Value LM Test lag ke 1 = 0.02057625
P Value LM Test lag ke 2 = 0.06769843
P Value LM Test lag ke 3 = 0.1361518
P Value LM Test lag ke 4 = 0.2206644
P Value LM Test lag ke 5 = 0.3403444
P Value LM Test lag ke 6 = 0.4601132
P Value LM Test lag ke 7 = 0.5416648
P Value LM Test lag ke 8 = 0.6579889
P Value LM Test lag ke 9 = 0.7222928
P Value LM Test lag ke 10 = 0.1147275
P Value LM Test lag ke 11 = 0.1600678
P Value LM Test lag ke 12 = 0.1912448
P Value LM Test lag ke 13 = 0.2318488
P Value LM Test lag ke 14 = 0.2806614
P Value LM Test lag ke 15 = 0.03113807
```

Lampiran 40 R Code Untuk Uji ARCH-LM Model GARCH(1,0) Tanpa ARIMA

```
> sisaan <- residuals(fit_garch10, standardize = TRUE)
> # Uji ARCH-LM
> for (i in 1:15) {
+   arch_test <- ArchTest(sisaan, lags = i, demean = TRUE)
+   cat("P Value LM Test lag ke", i, "=", arch_test$p.value, "\n")
+ }
```

```

P Value LM Test lag ke 1 = 0.6176541
P Value LM Test lag ke 2 = 0.6384742
P Value LM Test lag ke 3 = 0.817037
P Value LM Test lag ke 4 = 0.8952763
P Value LM Test lag ke 5 = 0.9461375
P Value LM Test lag ke 6 = 0.9763874
P Value LM Test lag ke 7 = 0.9757644
P Value LM Test lag ke 8 = 0.9893477
P Value LM Test lag ke 9 = 0.9578918
P Value LM Test lag ke 10 = 0.3360515
P Value LM Test lag ke 11 = 0.357259
P Value LM Test lag ke 12 = 0.2578832
P Value LM Test lag ke 13 = 0.3351513
P Value LM Test lag ke 14 = 0.34069
P Value LM Test lag ke 15 = 0.09223036

```

Lampiran 41 R Code Untuk Uji ARCH-LM Model GARCH(1,1) Tanpa ARIMA

```

> sisaan <- residuals(fit_garch11, standardize = TRUE)
> # Uji ARCH-LM
> for (i in 1:15) {
+   arch_test <- ArchTest(sisaan, lags = i, demean = TRUE)
+   cat("P value LM Test lag ke", i, "=", arch_test$p.value, "\n")
+ }

```

```

P Value LM Test lag ke 1 = 0.226236
P Value LM Test lag ke 2 = 0.3778075
P Value LM Test lag ke 3 = 0.4986657
P Value LM Test lag ke 4 = 0.6629153
P Value LM Test lag ke 5 = 0.7299148
P Value LM Test lag ke 6 = 0.8213768
P Value LM Test lag ke 7 = 0.8905275
P Value LM Test lag ke 8 = 0.9227591
P Value LM Test lag ke 9 = 0.8891222
P Value LM Test lag ke 10 = 0.2979924
P Value LM Test lag ke 11 = 0.374235
P Value LM Test lag ke 12 = 0.3373616
P Value LM Test lag ke 13 = 0.3990455
P Value LM Test lag ke 14 = 0.4200617
P Value LM Test lag ke 15 = 0.1355633

```

Lampiran 42 R Hasil Peramalan Model GARCH(0,1) Tanpa ARIMA

```

> print(perbandingan)
      Aktual Ramalan_GARCH
1    774529      1212756
2    726744      1220650
3    612742      1228582
4   1124781      1236553
5    852253      1244564
6    898335      1252614
7    926975      1260703
8    853713      1268832
9    856370      1277001
10   828647      1285210
11   724560      1293459
12   941137      1301748

```

	MAPE	MAE
1	52.18	413490.5

Lampiran 43 R Hasil Peramalan Model GARCH(1,0) tanpa ARIMA

```
> print(perbandingan)
      Aktual Ramalan_GARCH
1      774529      1223315
2      726744      1241941
3      612742      1260782
4     1124781      1279840
5      852253      1299115
6      898335      1318611
7      926975      1338328
8      853713      1358268
9      856370      1378433
10     828647      1398825
11     724560      1419445
12     941137      1440296
```

```
      MAPE      MAE
1  60.82 486367.8
```

Lampiran 44 R Hasil Peramalan Model GARCH(1,1) tanpa ARIMA

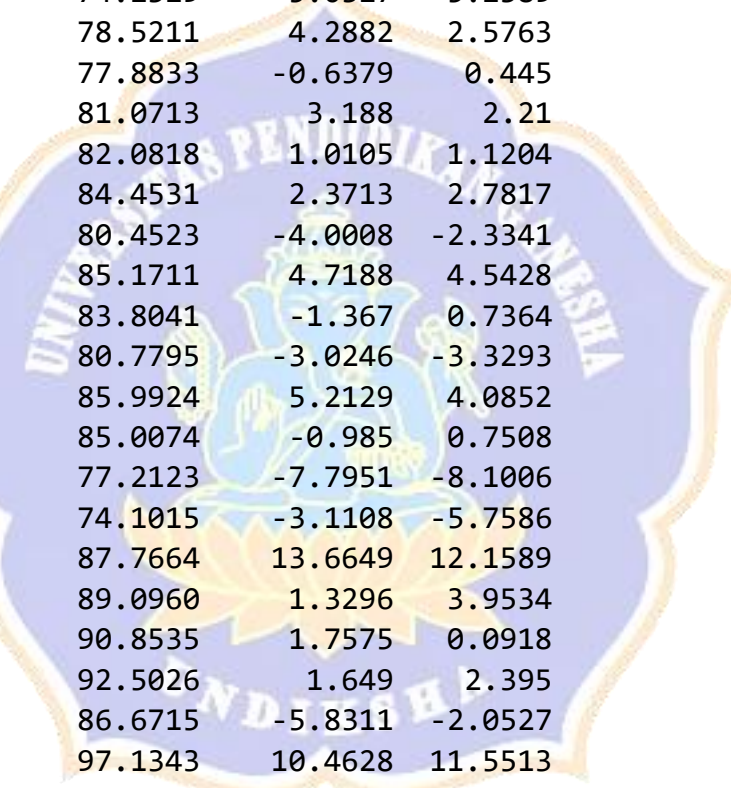
```
> print(perbandingan)
      Aktual Ramalan_GARCH
1      774529      1216124
2      726744      1227425
3      612742      1238805
4     1124781      1250266
5      852253      1261807
6      898335      1273429
7      926975      1285132
8      853713      1296916
9      856370      1308783
10     828647      1320732
11     724560      1332763
12     941137      1344878
```

```
      MAPE      MAE
1  54.89 436356.2
```

Lampiran 45 Hasil Transformasi, 1st Difference dan Residual Pada Model ARIMA(2,1,4)

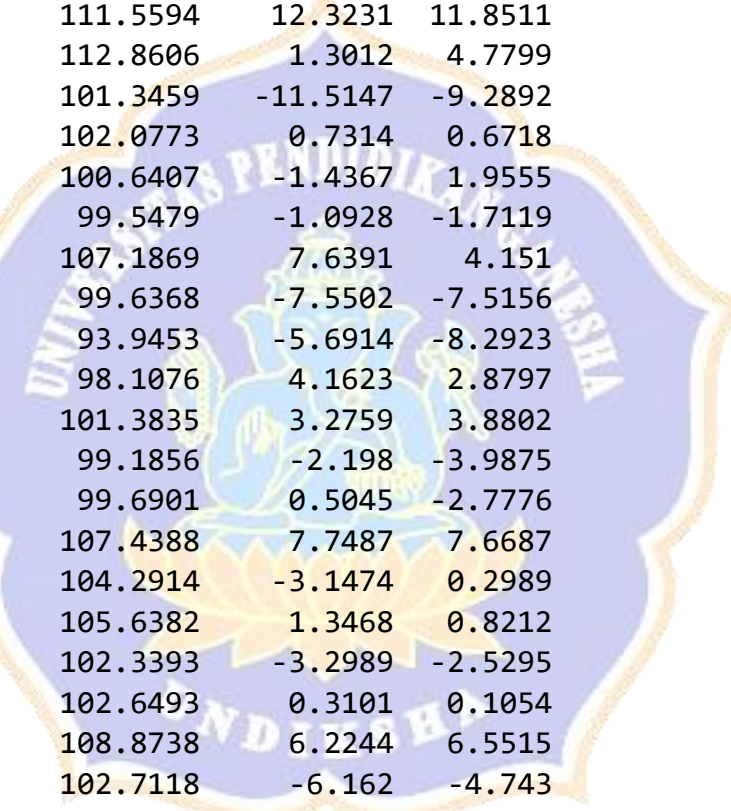
```
# Tampilkan sebagian data
> print(head(tabel_ringkasan_lengkap, 240))
      Aktual Transformed Difference Residual
1      167106      70.5310      *      *
2      133660      66.6327     -3.8983     -0.0039
3      118369      64.5981     -2.0346      1.0739
4      129730      66.1274      1.5293      3.4742
5      142186      67.6912      1.5638      2.6678
```

6	167718	70.5965	2.9053	2.5714
7	212463	74.9625	4.366	3.7192
8	171034	70.9487	-4.0139	-2.9994
9	168420	70.6715	-0.2771	-0.4115
10	150827	68.7159	-1.9556	-0.7713
11	269132	79.5825	10.8666	9.6691
12	207541	74.5186	-5.0638	-3.8837
13	174515	71.3128	-3.2059	-5.9105
14	161808	69.9556	-1.3572	-1.6232
15	194411	73.2941	3.3385	3.9693
16	174033	71.2627	-2.0314	-2.0117
17	190855	72.9517	1.689	-1.2632
18	201990	74.0083	1.0567	0.0846
19	254264	78.4480	4.4397	4.5255
20	217782	75.4335	-3.0145	-1.6536
21	218382	75.4861	0.0526	-0.9498
22	168684	70.6997	-4.7864	-4.5608
23	259543	78.8564	8.1568	6.6273
24	192242	73.0858	-5.7706	-4.1577
25	202857	74.0887	1.0029	-2.0768
26	161413	69.9121	-4.1766	-4.5764
27	171795	71.0287	1.1166	-0.1664
28	192182	73.0800	2.0513	1.514
29	188152	72.6881	-0.3919	-1.4701
30	204284	74.2205	1.5324	-0.1716
31	245909	77.7882	3.5677	3.5472
32	218117	75.4629	-2.3253	-0.86
33	196167	73.4614	-2.0014	-2.2765
34	238721	77.2067	3.7453	3.3933
35	234308	76.8432	-0.3636	0.7906
36	220882	75.7040	-1.1392	-1.7534
37	181266	72.0035	-3.7005	-4.407
38	144425	67.9612	-4.0423	-4.9743
39	161009	69.8676	1.9064	0.3612
40	165509	70.3590	0.4914	-0.5119
41	183736	72.2513	1.8923	-0.389
42	214957	75.1845	2.9332	1.6938
43	244032	77.6376	2.4531	3.0841
44	217822	75.4370	-2.2006	-0.6719
45	181846	72.0619	-3.3751	-2.9706
46	299724	81.7746	9.7128	9.4126
47	204579	74.2477	-7.527	-4.301
48	285739	80.7947	6.547	3.8337
49	225955	76.1404	-4.6542	-2.4934

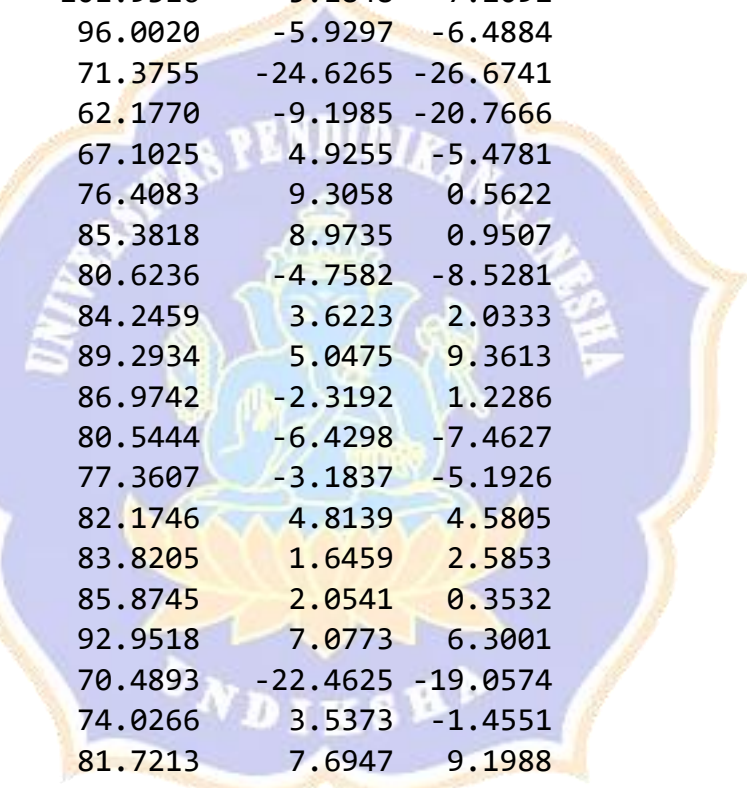


50	190792	72.9456	-3.1949	-3.6431
51	221181	75.7299	2.7844	2.1005
52	206631	74.4357	-1.2942	-0.9326
53	226339	76.1732	1.7375	-0.0714
54	256448	78.6178	2.4446	1.7176
55	329362	83.7417	5.124	5.6046
56	259511	78.8540	-4.8878	-2.8201
57	205304	74.3143	-4.5397	-5.0818
58	306112	82.2107	7.8965	7.4524
59	203416	74.1404	-8.0703	-5.3433
60	267742	79.4785	5.338	1.6798
61	264915	79.2657	-0.2128	0.2282
62	204419	74.2329	-5.0327	-5.2389
63	255203	78.5211	4.2882	2.5763
64	247100	77.8833	-0.6379	0.445
65	289635	81.0713	3.188	2.21
66	304213	82.0818	1.0105	1.1204
67	340610	84.4531	2.3713	2.7817
68	280972	80.4523	-4.0008	-2.3341
69	352257	85.1711	4.7188	4.5428
70	330337	83.8041	-1.367	0.7364
71	285526	80.7795	-3.0246	-3.3293
72	365948	85.9924	5.2129	4.0852
73	349575	85.0074	-0.985	0.7508
74	238789	77.2123	-7.7951	-8.1006
75	202995	74.1015	-3.1108	-5.7586
76	396898	87.7664	13.6649	12.1589
77	421369	89.0960	1.3296	3.9534
78	455456	90.8535	1.7575	0.0918
79	489307	92.5026	1.649	2.395
80	377570	86.6715	-5.8311	-2.0527
81	594662	97.1343	10.4628	11.5513
82	391722	87.4772	-9.6571	-5.5694
83	361395	85.7219	-1.7553	-5.2442
84	366605	86.0312	0.3093	-0.5537
85	280588	80.4246	-5.6067	-5.396
86	340508	84.4467	4.0222	0.7302
87	358313	85.5373	1.0906	-0.3023
88	385228	87.1103	1.5729	-0.362
89	463452	91.2512	4.141	3.4181
90	568264	96.0363	4.7851	6.2298
91	573103	96.2405	0.2041	2.5886
92	440751	90.1080	-6.1324	-4.6962
93	609633	97.7406	7.6326	7.4105

94	526302	94.2084	-3.5322	0.2094
95	574016	96.2788	2.0704	1.0912
96	554963	95.4684	-0.8105	-0.6302
97	333199	83.9864	-11.4819	-11.3693
98	305934	82.1987	-1.7878	-5.1928
99	307616	82.3124	0.1137	-1.6228
100	331378	83.8706	1.5582	-1.7281
101	525076	94.1534	10.2828	6.1602
102	569635	96.0943	1.9409	2.1733
103	524334	94.1200	-1.9743	-1.3623
104	661334	99.7511	5.6311	7.1974
105	572359	96.2092	-3.5419	0.947
106	667703	99.9904	3.7812	4.0698
107	545348	95.0513	-4.9391	-3.3957
108	719642	101.8799	6.8286	5.7605
109	426360	89.3599	-12.52	-9.8304
110	369525	86.2031	-3.1568	-6.8848
111	431393	89.6237	3.4206	1.4974
112	403211	88.1152	-1.5085	-2.6016
113	456491	90.9053	2.7901	-1.2846
114	785053	104.1174	13.2121	11.1867
115	474769	91.8053	-12.3121	-8.6814
116	878278	107.0732	15.2679	12.4519
117	473697	91.7533	-15.3199	-8.5443
118	758351	103.2218	11.4685	8.3887
119	678748	100.4013	-2.8205	1.0023
120	840660	105.9106	5.5093	4.6333
121	517500	93.8110	-12.0996	-10.4574
122	296581	81.5575	-12.2536	-15.0325
123	255403	78.5367	-3.0208	-6.5731
124	318800	83.0568	4.5201	0.9254
125	385366	87.1181	4.0614	-0.8779
126	667201	99.9716	12.8535	7.422
127	682941	100.5560	0.5844	1.9075
128	843958	106.0141	5.4581	7.576
129	615429	97.9723	-8.0418	-2.1627
130	549998	95.2537	-2.7186	-1.3923
131	468743	91.5116	-3.7422	-2.8972
132	792387	104.3593	12.8478	11.1385
133	528506	94.3071	-10.0522	-8.0008
134	483221	92.2126	-2.0945	-6.7166
135	503311	93.1595	0.9468	0.3711
136	528668	94.3144	1.1549	1.9813
137	651089	99.3624	5.048	3.7407



138	571646	96.1792	-3.1833	-4.0195
139	799765	104.6010	8.4218	6.6371
140	641684	99.0015	-5.5994	-1.8034
141	557081	95.5595	-3.442	-3.6224
142	619599	98.1380	2.5785	2.0992
143	529381	94.3462	-3.7917	-3.1884
144	733149	102.3543	8.008	5.4397
145	597558	97.2525	-5.1018	-4.0707
146	513852	93.6448	-3.6077	-5.7029
147	576438	96.3804	2.7356	1.716
148	534395	94.5694	-1.811	-1.0114
149	647790	99.2363	4.6669	2.5965
150	1035563	111.5594	12.3231	11.8511
151	1084950	112.8606	1.3012	4.7799
152	704662	101.3459	-11.5147	-9.2892
153	725240	102.0773	0.7314	0.6718
154	685244	100.6407	-1.4367	1.9555
155	655962	99.5479	-1.0928	-1.7119
156	882026	107.1869	7.6391	4.151
157	658308	99.6368	-7.5502	-7.5156
158	520462	93.9453	-5.6914	-8.2923
159	618834	98.1076	4.1623	2.8797
160	705710	101.3835	3.2759	3.8802
161	646467	99.1856	-2.198	-3.9875
162	659718	99.6901	0.5045	-2.7776
163	890368	107.4388	7.7487	7.6687
164	790323	104.2914	-3.1474	0.2989
165	832026	105.6382	1.3468	0.8212
166	732720	102.3393	-3.2989	-2.5295
167	741649	102.6493	0.3101	0.1054
168	939048	108.8738	6.2244	6.5515
169	743456	102.7118	-6.162	-4.743
170	655719	99.5387	-3.1731	-5.8121
171	762622	103.3666	3.828	2.7415
172	777287	103.8593	0.4927	1.6379
173	682521	100.5405	-3.3188	-4.4941
174	1156151	114.6595	14.119	11.4189
175	906347	107.9163	-6.7433	-2.5892
176	770364	103.6276	-4.2886	-5.5105
177	774144	103.7543	0.1267	0.115
178	762124	103.3498	-0.4046	0.7152
179	806397	104.8168	1.467	0.2205
180	960859	109.4984	4.6816	2.7718
181	793527	104.3968	-5.1017	-4.9441



182	692113	100.8918	-3.5049	-4.8405
183	787616	104.2021	3.3103	2.8754
184	795997	104.4778	0.2756	0.9094
185	656082	99.5524	-4.9253	-6.7747
186	1287877	117.7768	18.2244	14.7451
187	935930	108.7836	-8.9932	-3.5875
188	925360	108.4761	-0.3075	-2.2949
189	812003	104.9981	-3.478	-2.0833
190	853007	106.2965	1.2983	1.9192
191	852626	106.2846	-0.0118	-0.1074
192	1152901	114.5793	8.2947	6.2563
193	879702	107.1165	-7.4628	-6.2865
194	721105	101.9316	-5.1848	-7.2092
195	567452	96.0020	-5.9297	-6.4884
196	175120	71.3755	-24.6265	-26.6741
197	101948	62.1770	-9.1985	-20.7666
198	137395	67.1025	4.9255	-5.4781
199	229112	76.4083	9.3058	0.5622
200	355732	85.3818	8.9735	0.9507
201	283349	80.6236	-4.7582	-8.5281
202	337304	84.2459	3.6223	2.0333
203	425097	89.2934	5.0475	9.3613
204	382841	86.9742	-2.3192	1.2286
205	282248	80.5444	-6.4298	-7.4627
206	240608	77.3607	-3.1837	-5.1926
207	305579	82.1746	4.8139	4.5805
208	330593	83.8205	1.6459	2.5853
209	363959	85.8745	2.0541	0.3532
210	498852	92.9518	7.0773	6.3001
211	166718	70.4893	-22.4625	-19.0574
212	202187	74.0266	3.5373	-1.4551
213	298950	81.7213	7.6947	9.1988
214	468826	91.5156	9.7943	9.63
215	513482	93.6279	2.1123	1.0914
216	629590	98.5315	4.9036	5.3814
217	527447	94.2598	-4.2717	2.0553
218	389690	87.3629	-6.8969	-2.4323
219	547726	95.1550	7.7921	8.5641
220	500740	93.0399	-2.1151	0.3897
221	960692	109.4937	16.4538	14.625
222	753907	103.0704	-6.4233	-1.0812
223	784205	104.0893	1.0189	1.89
224	659567	99.6844	-4.4049	0.0871
225	622068	98.2357	-1.4487	0.7049

226	718066	101.8241	3.5885	3.6995
227	657949	99.6232	-2.201	-2.3312
228	930917	108.6381	9.0149	7.1377
229	720164	101.8984	-6.7397	-3.6975
230	629282	98.5194	-3.379	-4.1935
231	665751	99.9172	1.3978	1.4379
232	900880	107.7536	7.8364	8.4206
233	943713	109.0083	1.2547	2.3563
234	883793	107.2404	-1.7679	-2.3626
235	898260	107.6754	0.435	1.1265
236	712860	101.6392	-6.0362	-3.2092
237	755293	103.1177	1.4785	0.9225
238	813745	105.0543	1.9366	1.4708
239	749268	102.9117	-2.1426	-3.3869
240	1204902	115.8433	12.9316	10.8222



Lampiran 46 Hasil Uji ADF-Test pada Data Simulasi ($n = 20$)

b. Dengan Bantuan Microsoft Excel 2016

t	Y_t	diff	lag 1	lag 2	timed trend	lagged
1	100.22					
2	100.17	-0.05			1	100.22
3	101.24	1.07	-0.05		2	100.17
4	98.14	-3.10	1.07	-0.05	3	101.24
5	100.31	2.17	-3.10	1.07	4	98.14
6	100.58	0.27	2.17	-3.10	5	100.31
7	100.87	0.29	0.27	2.17	6	100.58
8	101.41	0.54	0.29	0.27	7	100.87
9	100.76	-0.65	0.54	0.29	8	101.41
10	100.39	-0.37	-0.65	0.54	9	100.76
11	98.09	-2.30	-0.37	-0.65	10	100.39
12	100.13	2.04	-2.30	-0.37	11	98.09
13	100.6	0.47	2.04	-2.30	12	100.13
14	101.37	0.77	0.47	2.04	13	100.6
15	102.56	1.19	0.77	0.47	14	101.37
16	99.02	-3.54	1.19	0.77	15	102.56
17	100.52	1.50	-3.54	1.19	16	99.02
18	98.25	-2.27	1.50	-3.54	17	100.52
19	100.6	2.35	-2.27	1.50	18	98.25
20	101.86	1.26	2.35	-2.27	19	100.6

Augmented (2lag)	coef	-1.72327
	standart error	0.47273
	t-stat	-3.6454

DF Critical Values
-2.109815578

c. Dengan Bantuan R-Studio 4.4.2

Augmented Dickey-Fuller Test
data: datasaham.ts
Dickey-Fuller = -3.6454, Lag order = 2, p-value = 0.04676
alternative hypothesis: stationary

Kesimpulan:

Berdasarkan hasil perhitungan pada uji *Augmented Dickey-Fuller* dengan 2 lag dan jumlah data sebanyak 20, diperoleh nilai koefisien sebesar -0.16446 dengan *standar error* 0.05657. Nilai $t_{statistic}$ yang dihasilkan adalah -3.6454. Jika dibandingkan dengan nilai t_{kritis} sebesar -2.10 pada taraf signifikansi 0,05, maka karena $t_{statistic} < t_{kritis}$ (-3.6454 < -2.10), maka keputusan uji adalah menerima H_0 . Dengan demikian, dapat disimpulkan bahwa data tidak mengandung akar unit (*stasioner*).



Lampiran 47 Hasil ACF dan PACF pada Data Simulasi ($n = 20$)

a. Dengan Bantuan Microsoft Excel 2016

t	Y_t	Lag 0	Lag 1	Lag 2	Lag 3	Lag 4
1	100.22	0.01809				
2	100.17	0.03404	0.024815			
3	101.24	0.78411	-0.16337	-0.1191		
4	98.14	4.90401	-1.96094	0.408575	0.29785	
5	100.31	0.00198	0.098545	-0.0394	0.00821	0.005985
6	100.58	0.05085	-0.01003	-0.49937	0.19968	-0.0416
7	100.87	0.26574	0.116245	-0.02294	-1.14157	0.456475
8	101.41	1.11408	0.54411	0.238015	-0.04697	-2.3374
9	100.76	0.16443	0.428005	0.209035	0.09144	-0.01804
10	100.39	0.00126	0.014395	0.03747	0.0183	0.008005
11	98.09	5.12796	-0.08039	-0.91825	-2.39018	-1.16735
12	100.13	0.0504	0.50838	-0.00797	-0.09103	-0.23696
13	100.6	0.06027	-0.05511	-0.55593	0.008715	0.09955
14	101.37	1.03124	0.249305	-0.22798	-2.2996	0.03605
15	102.56	4.86423	2.239685	0.54145	-0.49513	-4.99435
16	99.02	1.78089	-2.94324	-1.35518	-0.32762	0.299595
17	100.52	0.02739	-0.22086	0.36501	0.168065	0.04063
18	98.25	4.42892	-0.34829	2.808455	-4.64147	-2.13712
19	100.6	0.06027	-0.51665	0.04063	-0.32762	0.54145
20	101.86	2.26653	0.3696	-3.16832	0.24916	-2.00909

Denominator	Numerator	ACF	PACF (1)	PACF(2)	PACF(3)	PACF(4)
27.036695	27.036695	1				
27.036695	-1.7058153	-0.0630	-0.06309	-0.06865	-0.10502	-0.35718
27.036695	-2.2658205	-0.0838		-0.08814	-0.11647	-0.18764
27.036695	-10.719786	-0.3964			-0.41264	-0.47682
27.036695	-11.454186	-0.4236				-0.61108

1	-0.0630926	-0.08381	-0.39649
-0.063092595	1	-0.06309	-0.08381
-0.08380538	-0.0630926	1	-0.06309
-0.396490242	-0.0838054	-0.06309	1

Lampiran 48 Hasil Estimasi Model ARIMA(0,0,2) pada Data Simulasi ($n = 20$)

a. Dengan Bantuan Microsoft Excel 2016

	est	s.e	t	t_{tabel}	keterangan
θ_1	-0.570474	0.235722	-2.420113	-2.09302405	Signifikan
θ_2	-0.429526	0.202768	-2.118312	-2.09302405	Signifikan
μ	100.3522	0.046484	2158.86		

b. Dengan Bantuan R-Studio 4.4.2

z test of coefficients:				
	Estimate	Std. Error	z value	Pr(> z)
ma1	-0.570474	0.235722	-2.4201	0.01552 *
ma2	-0.429526	0.202768	-2.1183	0.03415 *
intercept	100.352219	0.046484	2158.8675	< 2e-16 ***

Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1				

Kesimpulan:

Berdasarkan hasil estimasi model ARIMA(0,0,2), seluruh parameter model, yaitu MA(1), MA(2), dan intersep, memiliki nilai $p\text{-value} < 0,05$. Hal ini menunjukkan bahwa semua parameter signifikan secara statistik dan berkontribusi nyata dalam membentuk model. Dengan demikian, model ARIMA(0,0,2) dapat dianggap sesuai untuk merepresentasikan pola dalam data.

Lampiran 49 Hasil Estimasi Model GARCH(1,1) pada Data Simulasi ($n = 20$)

a. Dengan Bantuan Microsoft Excel 2016

Data asli	Peramalan	ε_t	ε_t^2	<i>lagged</i>	ARCH-LM	σ_t^2	<i>log liklihood</i>
100.22	100.11	-0.11	0.01				
100.17	99.99	-0.18	0.03	0.01	1.02	0.88	-0.87
101.24	101.94	0.70	0.49	0.03	1.02	0.81	-1.12
98.14	96.34	-1.80	3.26	0.49	1.02	0.82	-2.80
100.31	99.80	-0.51	0.26	3.26	1.02	1.28	-1.15
100.58	99.92	-0.66	0.43	0.26	1.02	4.08	-1.68
100.87	100.88	0.01	0.00	0.43	1.02	1.30	-1.05
101.41	102.16	0.75	0.57	0.00	1.02	1.26	-1.26
100.76	101.50	0.74	0.55	0.57	1.02	0.83	-1.16
100.39	101.07	0.68	0.47	0.55	1.02	1.36	-1.25
98.09	96.54	-1.55	2.39	0.47	1.02	1.39	-1.94
100.13	99.43	-0.70	0.50	2.39	1.02	1.30	-1.24
100.60	99.87	-0.73	0.53	0.50	1.02	3.22	-1.59
101.37	101.71	0.34	0.11	0.53	1.02	1.47	-1.15
102.56	104.58	2.02	4.08	0.11	1.02	1.37	-2.56
99.02	98.89	-0.13	0.02	4.08	1.02	0.95	-0.90
100.52	101.44	0.92	0.84	0.02	1.02	4.88	-1.80
98.25	96.63	-1.62	2.64	0.84	1.02	1.12	-2.15
100.60	100.37	-0.23	0.05	2.64	1.02	1.65	-1.19
101.86	102.55	0.69	0.47	0.05	1.02	3.50	-1.61

<i>Unconditional Varians</i>	0.880517
ω_1	0.0875
α_1	0.640094
β_1	0.077218
<i>log liklihood</i>	-28.4671

Kesimpulan

Berdasarkan hasil uji heteroskedastisitas menggunakan ARCH-LM dengan lag 1 terhadap residual model ARIMA(0,0,2), diperoleh nilai statistik sebesar 1.02 yang konstan di setiap observasi. Hal ini menunjukkan bahwa tidak terdapat efek ARCH yang signifikan dalam residual model, sehingga dapat disimpulkan bahwa residual bersifat homoskedastis. Selanjutnya, estimasi model GARCH(1,1) menunjukkan bahwa seluruh parameter, yaitu $\omega_1 = 0.0875$, $\alpha_1 = 0.6401$, dan $\beta_1 = 0.0772$, berhasil diestimasi dan menghasilkan nilai log-likelihood sebesar -28.4671. Namun, karena tidak terdeteksi adanya heteroskedastisitas pada residual ARIMA sebelumnya, maka model GARCH(1,1) tidak diperlukan secara substansial dalam pemodelan ini. Dengan demikian, model GARCH dalam konteks ini hanya digunakan sebagai ilustrasi penerapan, bukan sebagai model utama, karena data tidak menunjukkan pola volatilitas bersyarat (*conditional heteroskedasticity*).

Lampiran 50 Hasil Uji *White Noise* pada Residual ARIMA(0,0,2) pada Data Simulasi ($n = 20$)

a. Dengan Bantuan Microsoft Excel 2016

Residual	Lag 0	Lag 1	Lag 2	Lag 3	Lag 4	Lag 6	Lag 7	Lag 8	Lag 9	Lag 10	Lag 11	Lag 12	Lag 13	Lag 14	Lag 15
*															
-0.1076	0.0015														
-0.1756	0.01	0.0042													
0.70112	0.59	-0.08	-0.03												
-1.8045	3.01	-1.34	0.19	0.07											
-0.5117	0.20	0.77	-0.34	0.05	0.02										
-0.658	0.35	0.26	1.02	-0.45	0.06	0.02									
0.005	0.01	-0.04	-0.03	-0.13	0.06	-0.01	0.00								
0.75423	0.68	0.06	-0.48	-0.36	-1.43	0.63	-0.09	-0.03							
0.74364	0.66	0.67	0.06	-0.48	-0.36	-1.41	0.62	-0.09	-0.03						
0.68488	0.57	0.61	0.62	0.06	-0.44	-0.33	-1.31	0.58	-0.08	-0.03					
-1.546	2.18	-1.11	-1.20	-1.22	-0.11	0.87	0.66	2.57	-1.14	0.16	0.06				
-0.7049	0.41	0.94	-0.48	-0.52	-0.52	-0.05	0.38	0.28	1.11	-0.49	0.07	0.02			
-0.7271	0.43	0.42	0.97	-0.50	-0.53	-0.54	-0.05	0.39	0.29	1.14	-0.51	0.07	0.03		
0.33685	0.16	-0.27	-0.26	-0.60	0.31	0.33	0.33	0.03	-0.24	-0.18	-0.70	0.31	-0.04	-0.02	
2.01899	4.36	0.85	-1.37	-1.33	-3.08	1.57	1.69	1.72	0.15	-1.23	-0.93	-3.62	1.61	-0.22	-0.08
-0.1258	0.00	-0.12	-0.02	0.04	0.04	0.08	-0.04	-0.05	-0.05	0.00	0.03	0.03	0.10	-0.04	0.01
0.91623	0.97	-0.06	2.06	0.40	-0.65	-0.63	-1.45	0.74	0.80	0.81	0.07	-0.58	-0.44	-1.71	0.76
-1.6249	2.42	-1.53	0.09	-3.25	-0.63	1.03	0.99	2.30	-1.17	-1.26	-1.28	-0.11	0.92	0.69	2.70
-0.2301	0.03	0.25	-0.16	0.01	-0.34	-0.07	0.11	0.10	0.24	-0.12	-0.13	-0.13	-0.01	0.10	0.07
0.68826	0.57	-0.12	-1.18	0.74	-0.04	1.58	0.31	-0.50	-0.48	-1.12	0.57	0.61	0.62	0.06	-0.45

lag	Denominator	Numerator	ACF
1	17.61	17.6	1.000
2	17.61	0.2	0.009
3	17.61	-0.6	-0.031
4	17.61	-7.5	-0.424
5	17.61	-7.7	-0.435
6	17.61	3.1	0.175
7	17.61	2.1	0.122
8	17.61	8.0	0.457
9	17.61	-0.6	-0.034
10	17.61	-2.3	-0.132
11	17.61	-2.7	-0.156
12	17.61	-3.4	-0.193
13	17.61	2.8	0.158
14	17.61	-1.2	-0.065
15	17.61	3.0	0.171

PACF (2)	PACF (3)	PACF (4)	PACF (5)	PACF (6)	PACF (7)	PACF (8)	PACF (9)	PACF (10)	PACF (11)	PACF (12)	PACF (13)	PACF (14)	PACF (15)
0.0091	0.0093	-0.0040	-0.2286	-0.184	-0.1779	-0.1681	-0.1568	-0.1537	-0.1581	-0.1616	-0.1613	-0.1637	-0.1674
	-0.0316	-0.0276	-0.0422	-0.006	-0.0458	-0.0547	-0.0595	-0.0634	-0.0530	-0.0545	-0.0529	-0.0477	-0.0485
		-0.4239	-0.4261	-0.422	-0.4550	-0.3895	-0.3829	-0.3809	-0.3954	-0.3934	-0.3927	-0.3663	-0.3660

			-0.5296	-0.510	-0.5111	-0.4528	-0.4928	-0.4942	-0.4885	-0.4930	-0.4938	-0.4834	-0.4825
				0.0835	0.0693	0.0752	0.0408	0.0581	0.0507	0.0503	0.0524	0.0383	0.0374
					-0.0768	-0.0540	-0.0588	-0.0454	0.0170	0.0156	0.0158	0.0518	0.0507
						0.1280	0.1132	0.1153	0.1634	0.1769	0.1775	0.1807	0.1840
							-0.0882	-0.0828	-0.0747	-0.0638	-0.0697	-0.0591	-0.0582
								0.0350	0.0544	0.0559	0.0511	-0.0490	-0.0483
									0.1264	0.1308	0.1301	0.0505	0.0418
										0.0277	0.0257	0.0150	0.0084
											-0.0120	-0.0447	-0.0456
												-0.2028	-0.2057
													-0.0180

Tabel Matrix Ordo 15 x 15

1.00	0.01	-0.03	-0.42	-0.44	0.18	0.12	0.46	-0.03	-0.13	-0.16	-0.19	0.16	-0.07	0.17
0.01	1.00	0.01	-0.03	-0.42	-0.44	0.18	0.12	0.46	-0.03	-0.13	-0.16	-0.19	0.16	-0.07
-0.03	0.01	1.00	0.01	-0.03	-0.42	-0.44	0.18	0.12	0.46	-0.03	-0.13	-0.16	-0.19	0.16
-0.42	-0.03	0.01	1.00	0.01	-0.03	-0.42	-0.44	0.18	0.12	0.46	-0.03	-0.13	-0.16	-0.19
-0.44	-0.42	-0.03	0.01	1.00	0.01	-0.03	-0.42	-0.44	0.18	0.12	0.46	-0.03	-0.13	-0.16
0.18	-0.44	-0.42	-0.03	0.01	1.00	0.01	-0.03	-0.42	-0.44	0.18	0.12	0.46	-0.03	-0.13
0.12	0.18	-0.44	-0.42	-0.03	0.01	1.00	0.01	-0.03	-0.42	-0.44	0.18	0.12	0.46	-0.03
0.46	0.12	0.18	-0.44	-0.42	-0.03	0.01	1.00	0.01	-0.03	-0.42	-0.44	0.18	0.12	0.46
-0.03	0.46	0.12	0.18	-0.44	-0.42	-0.03	0.01	1.00	0.01	-0.03	-0.42	-0.44	0.18	0.12

-0.13	-0.03	0.46	0.12	0.18	-0.44	-0.42	-0.03	0.01	1.00	0.01	-0.03	-0.42	-0.44	0.18
-0.16	-0.13	-0.03	0.46	0.12	0.18	-0.44	-0.42	-0.03	0.01	1.00	0.01	-0.03	-0.42	-0.44
-0.19	-0.16	-0.13	-0.03	0.46	0.12	0.18	-0.44	-0.42	-0.03	0.01	1.00	0.01	-0.03	-0.42
0.16	-0.19	-0.16	-0.13	-0.03	0.46	0.12	0.18	-0.44	-0.42	-0.03	0.01	1.00	0.01	-0.03
-0.07	0.16	-0.19	-0.16	-0.13	-0.03	0.46	0.12	0.18	-0.44	-0.42	-0.03	0.01	1.00	0.01
0.17	-0.07	0.16	-0.19	-0.16	-0.13	-0.03	0.46	0.12	0.18	-0.44	-0.42	-0.03	0.01	1.00

ACF	X-Squared	h	p-value
1			
0.009052539	0.001897754	1	0.9653
-0.03147292	0.027735264	2	0.986228081
-0.42404111	5.034704238	3	0.169273496
-0.43525380	5.304484527	4	0.257457411

b. Dengan Bantuan R-Studio 4.4.2

Box-Ljung test

data: sisaan.da
X-squared = 0.0018978, df = 1, p-value = 0.9653

Kesimpulan:

Hasil uji *Box-Ljung* terhadap residual model ARIMA(0,0,2) menghasilkan nilai p-value sebesar 0.9653. Karena nilai ini jauh di atas taraf signifikansi 5%, maka dapat disimpulkan bahwa tidak terdapat autokorelasi yang signifikan pada residual. Dengan demikian, residual bersifat *white noise*, dan model ARIMA(0,0,2) telah menangkap seluruh pola yang terkandung dalam data secara memadai.



Lampiran 51 Hasil Uji Homoskedastisitas Residual Model ARIMA(2,1,4) pada Data Simulasi ($n = 20$)

a. Dengan Bantuan Microsoft Excel 2016

Residual^2	Lag 0	Lag 1	Lag 2	Lag 3	Lag 4	Lag 6	Lag 7	Lag 8	Lag 9	Lag 10	Lag 11	Lag 12	Lag 13	Lag 14	Lag 15
*															
0.01	0.8														
0.03	0.7	0.7													
0.49	0.2	0.3	0.3												
3.26	5.6	-0.9	-2.0	-2.1											
0.26	0.4	-1.5	0.2	0.5	0.5										
0.43	0.2	0.3	-1.1	0.2	0.4	0.4									
0.00	0.8	0.4	0.6	-2.1	0.3	0.8	0.8								
0.57	0.1	0.3	0.1	0.2	-0.8	0.1	0.3	0.3							
0.55	0.1	0.1	0.3	0.2	0.2	-0.8	0.1	0.3	0.3						
0.47	0.2	0.1	0.1	0.4	0.2	0.3	-1.0	0.2	0.4	0.4					
2.39	2.3	-0.6	-0.5	-0.5	-1.3	-0.7	-0.9	3.6	-0.6	-1.3	-1.3				
0.50	0.2	-0.6	0.2	0.1	0.1	0.3	0.2	0.2	-0.9	0.2	0.3	0.3			
0.53	0.1	0.1	-0.5	0.1	0.1	0.1	0.3	0.2	0.2	-0.8	0.1	0.3	0.3		
0.11	0.6	0.3	0.3	-1.2	0.3	0.3	0.2	0.7	0.3	0.5	-1.8	0.3	0.7	0.7	
4.08	10.2	-2.5	-1.1	-1.2	4.8	-1.3	-1.1	-1.0	-2.8	-1.4	-2.0	7.6	-1.3	-2.7	-2.8
0.02	0.8	-2.8	0.7	0.3	0.3	-1.3	0.4	0.3	0.3	0.8	0.4	0.5	-2.1	0.3	0.7
0.84	0.0	0.0	-0.1	0.0	0.0	0.0	-0.1	0.0	0.0	0.0	0.0	0.0	0.0	-0.1	0.0
2.64	3.1	-0.1	-1.5	5.6	-1.4	-0.6	-0.7	2.6	-0.7	-0.6	-0.6	-1.6	-0.8	-1.1	4.2
0.05	0.7	-1.5	0.0	0.7	-2.7	0.6	0.3	0.3	-1.3	0.3	0.3	0.3	0.7	0.4	0.5
0.47	0.2	0.3	-0.7	0.0	0.4	-1.3	0.3	0.1	0.2	-0.6	0.2	0.1	0.1	0.4	0.2

lag	Denominator	Numerator	ACF
1	27.05	27.1	1.000
2	27.05	-7.3	-0.270
3	27.05	-4.8	-0.177
4	27.05	1.3	0.050
5	27.05	1.7	0.061
6	27.05	-3.1	-0.116
7	27.05	-0.8	-0.031
8	27.05	7.8	0.288
9	27.05	-4.7	-0.172
10	27.05	-2.6	-0.098
11	27.05	-4.3	-0.160
12	27.05	7.9	0.293
13	27.05	-2.2	-0.083
14	27.05	-2.2	-0.080
15	27.05	2.8	0.105



PACF (2)	PACF (3)	PACF (4)	PACF (5)	PACF (6)	PACF (7)	PACF (8)	PACF (9)	PACF (10)	PACF (11)	PACF (12)	PACF (13)	PACF (14)	PACF (15)
-0.2704	-0.3434	-0.3698	-0.3698	-0.369	-0.3814	-0.3570	-0.3495	-0.3515	-0.3709	-0.3340	-0.3341	-0.3340	-0.3350
	-0.2698	-0.3034	-0.3035	-0.314	-0.3188	-0.2832	-0.2835	-0.2697	-0.2866	-0.2665	-0.2662	-0.2628	-0.2631
		-0.0977	-0.0979	-0.132	-0.1455	-0.1279	-0.1303	-0.1316	-0.0652	-0.0490	-0.0489	-0.0570	-0.0534

			-0.0005	-0.042	-0.0743	-0.0397	-0.0410	-0.0458	-0.0550	-0.0744	-0.0743	-0.0784	-0.0874
				-0.112	-0.1502	-0.0746	-0.0786	-0.0812	-0.1070	-0.1019	-0.1021	-0.1059	-0.1106
					-0.1026	-0.0121	-0.0211	-0.0290	-0.0436	-0.0312	-0.0311	-0.0260	-0.0304
						0.2372	0.2259	0.2086	0.1667	0.1731	0.1732	0.1723	0.1780
							-0.0316	-0.0530	-0.1388	-0.1312	-0.1312	-0.1342	-0.1350
								-0.0612	-0.1730	-0.1397	-0.1397	-0.1418	-0.1453
									-0.3182	-0.2751	-0.2748	-0.2763	-0.2788
										0.1162	0.1166	0.1087	0.1069
											0.0010	-0.0088	-0.0174
												-0.0294	-0.0404
													-0.0327

Tabel Matrix Ordo 15 x 15

1.00	-0.27	-0.18	0.05	0.06	-0.12	-0.03	0.29	-0.17	-0.10	-0.16	0.29	-0.08	-0.08	0.10
-0.27	1.00	-0.27	-0.18	0.05	0.06	-0.12	-0.03	0.29	-0.17	-0.10	-0.16	0.29	-0.08	-0.08
-0.18	-0.27	1.00	-0.27	-0.18	0.05	0.06	-0.12	-0.03	0.29	-0.17	-0.10	-0.16	0.29	-0.08
0.05	-0.18	-0.27	1.00	-0.27	-0.18	0.05	0.06	-0.12	-0.03	0.29	-0.17	-0.10	-0.16	0.29
0.06	0.05	-0.18	-0.27	1.00	-0.27	-0.18	0.05	0.06	-0.12	-0.03	0.29	-0.17	-0.10	-0.16
-0.12	0.06	0.05	-0.18	-0.27	1.00	-0.27	-0.18	0.05	0.06	-0.12	-0.03	0.29	-0.17	-0.10
-0.03	-0.12	0.06	0.05	-0.18	-0.27	1.00	-0.27	-0.18	0.05	0.06	-0.12	-0.03	0.29	-0.17
0.29	-0.03	-0.12	0.06	0.05	-0.18	-0.27	1.00	-0.27	-0.18	0.05	0.06	-0.12	-0.03	0.29
-0.17	0.29	-0.03	-0.12	0.06	0.05	-0.18	-0.27	1.00	-0.27	-0.18	0.05	0.06	-0.12	-0.03

-0.10	-0.17	0.29	-0.03	-0.12	0.06	0.05	-0.18	-0.27	1.00	-0.27	-0.18	0.05	0.06	-0.12
-0.16	-0.10	-0.17	0.29	-0.03	-0.12	0.06	0.05	-0.18	-0.27	1.00	-0.27	-0.18	0.05	0.06
0.29	-0.16	-0.10	-0.17	0.29	-0.03	-0.12	0.06	0.05	-0.18	-0.27	1.00	-0.27	-0.18	0.05
-0.08	0.29	-0.16	-0.10	-0.17	0.29	-0.03	-0.12	0.06	0.05	-0.18	-0.27	1.00	-0.27	-0.18
-0.08	-0.08	0.29	-0.16	-0.10	-0.17	0.29	-0.03	-0.12	0.06	0.05	-0.18	-0.27	1.00	-0.27
0.10	-0.08	-0.08	0.29	-0.16	-0.10	-0.17	0.29	-0.03	-0.12	0.06	0.05	-0.18	-0.27	1.00

ACF	X-Squared	h	p-value
1			
-0.27043	1.693572464	1	0.193130709
-0.17694	0.724985958	2	0.6959392
0.049729	0.057268403	3	0.996417038
0.061318	0.087070158	4	0.999079409

b. Dengan Bantuan R-Studio 4.4.2

Box-Ljung test

data: (sisaan.da)^2
X-squared = 1.6936, df = 1, p-value = 0.1931

Kesimpulan:

Hasil uji *Box-Ljung* terhadap residual kuadrat (e_t^2) menghasilkan nilai *p-value* sebesar 0.1931. Karena nilai ini lebih besar dari taraf signifikansi 5%, maka dapat disimpulkan bahwa tidak terdapat autokorelasi signifikan pada kuadrat residual. Dengan demikian, residual bersifat homoskedastis, dan tidak terdapat indikasi efek ARCH dalam model ARIMA(0,0,2) ini.



Lampiran 52 Hasil Uji Normalitas Residual Model ARIMA(2,1,4) pada Data Simulasi ($n = 20$)

a. Dengan Bantuan Microsoft Excel 2016

No	Residual	Z	F(Z)	S(Z)	F(Z)-S(Z)	X-Rata
1	-1.8045	-1.8034	0.0357	0.0500	0.0143	3.0143
2	-1.6249	-1.6168	0.0530	0.1000	0.0470	2.4229
3	-1.5460	-1.5349	0.0624	0.1500	0.0876	2.1835
4	-0.7271	-0.6842	0.2469	0.2000	0.0469	0.4339
5	-0.7049	-0.6612	0.2542	0.2500	0.0042	0.4052
6	-0.6580	-0.6124	0.2701	0.3000	0.0299	0.3476
7	-0.5117	-0.4605	0.3226	0.3500	0.0274	0.1965
8	-0.2301	-0.1680	0.4333	0.4000	0.0333	0.0262
9	-0.1756	-0.1114	0.4556	0.4500	0.0056	0.0115
10	-0.1258	-0.0597	0.4762	0.5000	0.0238	0.0033
11	-0.1076	-0.0408	0.4837	0.5500	0.0663	0.0015
12	0.0050	0.0762	0.5304	0.6000	0.0696	0.0054
13	0.3369	0.4209	0.6631	0.6500	0.0131	0.1642
14	0.6849	0.7824	0.7830	0.7000	0.0830	0.5674
15	0.6883	0.7859	0.7840	0.7500	0.0340	0.5725
16	0.7011	0.7993	0.7879	0.8000	0.0121	0.5921
17	0.7436	0.8434	0.8005	0.8500	0.0495	0.6593
18	0.7542	0.8544	0.8036	0.9000	0.0964	0.6766
19	0.9162	1.0227	0.8468	0.9500	0.1032	0.9694
20	2.0190	2.1681	0.9849	1.0000	0.0151	4.3570

N	20
Jumlah	-1.37
Rata - rata	-0.07
Simpangan Deviasi	0.9268605
L_{hitung}	0.1032
L_{tabel}	0.198115623
Keterangan	DATA BERDISTRIBUSI NORMAL

Kesimpulan:

Uji normalitas dilakukan terhadap residual model dengan jumlah data sebanyak 20, nilai rata-rata sebesar -0.07, dan simpangan baku sebesar 0.9268605. Berdasarkan perhitungan diperoleh nilai statistik L_{hitung} sebesar 0.1032. Jika dibandingkan

dengan nilai L_{tabel} pada taraf signifikansi 5% sebesar 0.198, maka karena $L_{hitung} < L_{tabel}$, keputusan uji adalah menerima H_0 . Dengan demikian, dapat disimpulkan bahwa data residual berdistribusi normal.



Lampiran 53 Hasil Uji ADF-Test Sebelum *Differencing*

a. Dengan Bantuan Microsoft Excel 2016

Y_t	<i>Diff</i>	<i>lag 1</i>	<i>lag 2</i>	<i>lag 3</i>	<i>lag 4</i>	<i>lag 5</i>	<i>lag 6</i>	<i>Timed trend</i>	<i>lagged</i>
167106									
133660	-33446							1	167106
118369	-15291	-33446						2	133660
129730	11361	-15291	-33446					3	118369
142186	12456	11361	-15291	-33446				4	129730
167718	25532	12456	11361	-15291	-33446			5	142186
212463	44745	25532	12456	11361	-15291	-33446		6	167718
171034	-41429	44745	25532	12456	11361	-15291	-33446	7	212463
168420	-2614	-41429	44745	25532	12456	11361	-15291	8	171034
150827	-17593	-2614	-41429	44745	25532	12456	11361	9	168420
269132	118305	-17593	-2614	-41429	44745	25532	12456	10	150827
207541	-61591	118305	-17593	-2614	-41429	44745	25532	11	269132
174515	-33026	-61591	118305	-17593	-2614	-41429	44745	12	207541
161808	-12707	-33026	-61591	118305	-17593	-2614	-41429	13	174515
194411	32603	-12707	-33026	-61591	118305	-17593	-2614	14	161808
174033	-20378	32603	-12707	-33026	-61591	118305	-17593	15	194411
190855	16822	-20378	32603	-12707	-33026	-61591	118305	16	174033
201990	11135	16822	-20378	32603	-12707	-33026	-61591	17	190855
254264	52274	11135	16822	-20378	32603	-12707	-33026	18	201990
217782	-36482	52274	11135	16822	-20378	32603	-12707	19	254264
218382	600	-36482	52274	11135	16822	-20378	32603	20	217782

168684	-49698	600	-36482	52274	11135	16822	-20378	21	218382
259543	90859	-49698	600	-36482	52274	11135	16822	22	168684
192242	-67301	90859	-49698	600	-36482	52274	11135	23	259543
202857	10615	-67301	90859	-49698	600	-36482	52274	24	192242
161413	-41444	10615	-67301	90859	-49698	600	-36482	25	202857
171795	10382	-41444	10615	-67301	90859	-49698	600	26	161413
192182	20387	10382	-41444	10615	-67301	90859	-49698	27	171795
188152	-4030	20387	10382	-41444	10615	-67301	90859	28	192182
204284	16132	-4030	20387	10382	-41444	10615	-67301	29	188152
245909	41625	16132	-4030	20387	10382	-41444	10615	30	204284
218117	-27792	41625	16132	-4030	20387	10382	-41444	31	245909
196167	-21950	-27792	41625	16132	-4030	20387	10382	32	218117
238721	42554	-21950	-27792	41625	16132	-4030	20387	33	196167
234308	-4413	42554	-21950	-27792	41625	16132	-4030	34	238721
220882	-13426	-4413	42554	-21950	-27792	41625	16132	35	234308
181266	-39616	-13426	-4413	42554	-21950	-27792	41625	36	220882
144425	-36841	-39616	-13426	-4413	42554	-21950	-27792	37	181266
161009	16584	-36841	-39616	-13426	-4413	42554	-21950	38	144425
165509	4500	16584	-36841	-39616	-13426	-4413	42554	39	161009
183736	18227	4500	16584	-36841	-39616	-13426	-4413	40	165509
214957	31221	18227	4500	16584	-36841	-39616	-13426	41	183736
244032	29075	31221	18227	4500	16584	-36841	-39616	42	214957
217822	-26210	29075	31221	18227	4500	16584	-36841	43	244032
181846	-35976	-26210	29075	31221	18227	4500	16584	44	217822
299724	117878	-35976	-26210	29075	31221	18227	4500	45	181846
204579	-95145	117878	-35976	-26210	29075	31221	18227	46	299724

285739	81160	-95145	117878	-35976	-26210	29075	31221	47	204579
225955	-59784	81160	-95145	117878	-35976	-26210	29075	48	285739
190792	-35163	-59784	81160	-95145	117878	-35976	-26210	49	225955
221181	30389	-35163	-59784	81160	-95145	117878	-35976	50	190792
206631	-14550	30389	-35163	-59784	81160	-95145	117878	51	221181
226339	19708	-14550	30389	-35163	-59784	81160	-95145	52	206631
256448	30109	19708	-14550	30389	-35163	-59784	81160	53	226339
329362	72914	30109	19708	-14550	30389	-35163	-59784	54	256448
259511	-69851	72914	30109	19708	-14550	30389	-35163	55	329362
205304	-54207	-69851	72914	30109	19708	-14550	30389	56	259511
306112	100808	-54207	-69851	72914	30109	19708	-14550	57	205304
203416	-102696	100808	-54207	-69851	72914	30109	19708	58	306112
267742	64326	-102696	100808	-54207	-69851	72914	30109	59	203416
264915	-2827	64326	-102696	100808	-54207	-69851	72914	60	267742
204419	-60496	-2827	64326	-102696	100808	-54207	-69851	61	264915
255203	50784	-60496	-2827	64326	-102696	100808	-54207	62	204419
247100	-8103	50784	-60496	-2827	64326	-102696	100808	63	255203
289635	42535	-8103	50784	-60496	-2827	64326	-102696	64	247100
304213	14578	42535	-8103	50784	-60496	-2827	64326	65	289635
340610	36397	14578	42535	-8103	50784	-60496	-2827	66	304213
280972	-59638	36397	14578	42535	-8103	50784	-60496	67	340610
352257	71285	-59638	36397	14578	42535	-8103	50784	68	280972
330337	-21920	71285	-59638	36397	14578	42535	-8103	69	352257
285526	-44811	-21920	71285	-59638	36397	14578	42535	70	330337
365948	80422	-44811	-21920	71285	-59638	36397	14578	71	285526
349575	-16373	80422	-44811	-21920	71285	-59638	36397	72	365948

238789	-110786	-16373	80422	-44811	-21920	71285	-59638	73	349575
202995	-35794	-110786	-16373	80422	-44811	-21920	71285	74	238789
396898	193903	-35794	-110786	-16373	80422	-44811	-21920	75	202995
421369	24471	193903	-35794	-110786	-16373	80422	-44811	76	396898
455456	34087	24471	193903	-35794	-110786	-16373	80422	77	421369
489307	33851	34087	24471	193903	-35794	-110786	-16373	78	455456
377570	-111737	33851	34087	24471	193903	-35794	-110786	79	489307
594662	217092	-111737	33851	34087	24471	193903	-35794	80	377570
391722	-202940	217092	-111737	33851	34087	24471	193903	81	594662
361395	-30327	-202940	217092	-111737	33851	34087	24471	82	391722
366605	5210	-30327	-202940	217092	-111737	33851	34087	83	361395
280588	-86017	5210	-30327	-202940	217092	-111737	33851	84	366605
340508	59920	-86017	5210	-30327	-202940	217092	-111737	85	280588
358313	17805	59920	-86017	5210	-30327	-202940	217092	86	340508
385228	26915	17805	59920	-86017	5210	-30327	-202940	87	358313
463452	78224	26915	17805	59920	-86017	5210	-30327	88	385228
568264	104812	78224	26915	17805	59920	-86017	5210	89	463452
573103	4839	104812	78224	26915	17805	59920	-86017	90	568264
440751	-132352	4839	104812	78224	26915	17805	59920	91	573103
609633	168882	-132352	4839	104812	78224	26915	17805	92	440751
526302	-83331	168882	-132352	4839	104812	78224	26915	93	609633
574016	47714	-83331	168882	-132352	4839	104812	78224	94	526302
554963	-19053	47714	-83331	168882	-132352	4839	104812	95	574016
333199	-221764	-19053	47714	-83331	168882	-132352	4839	96	554963
305934	-27265	-221764	-19053	47714	-83331	168882	-132352	97	333199
307616	1682	-27265	-221764	-19053	47714	-83331	168882	98	305934

331378	23762	1682	-27265	-221764	-19053	47714	-83331	99	307616
525076	193698	23762	1682	-27265	-221764	-19053	47714	100	331378
569635	44559	193698	23762	1682	-27265	-221764	-19053	101	525076
524334	-45301	44559	193698	23762	1682	-27265	-221764	102	569635
661334	137000	-45301	44559	193698	23762	1682	-27265	103	524334
572359	-88975	137000	-45301	44559	193698	23762	1682	104	661334
667703	95344	-88975	137000	-45301	44559	193698	23762	105	572359
545348	-122355	95344	-88975	137000	-45301	44559	193698	106	667703
719642	174294	-122355	95344	-88975	137000	-45301	44559	107	545348
426360	-293282	174294	-122355	95344	-88975	137000	-45301	108	719642
369525	-56835	-293282	174294	-122355	95344	-88975	137000	109	426360
431393	61868	-56835	-293282	174294	-122355	95344	-88975	110	369525
403211	-28182	61868	-56835	-293282	174294	-122355	95344	111	431393
456491	53280	-28182	61868	-56835	-293282	174294	-122355	112	403211
785053	328562	53280	-28182	61868	-56835	-293282	174294	113	456491
474769	-310284	328562	53280	-28182	61868	-56835	-293282	114	785053
878278	403509	-310284	328562	53280	-28182	61868	-56835	115	474769
473697	-404581	403509	-310284	328562	53280	-28182	61868	116	878278
758351	284654	-404581	403509	-310284	328562	53280	-28182	117	473697
678748	-79603	284654	-404581	403509	-310284	328562	53280	118	758351
840660	161912	-79603	284654	-404581	403509	-310284	328562	119	678748
517500	-323160	161912	-79603	284654	-404581	403509	-310284	120	840660
296581	-220919	-323160	161912	-79603	284654	-404581	403509	121	517500
255403	-41178	-220919	-323160	161912	-79603	284654	-404581	122	296581
318800	63397	-41178	-220919	-323160	161912	-79603	284654	123	255403
385366	66566	63397	-41178	-220919	-323160	161912	-79603	124	318800

667201	281835	66566	63397	-41178	-220919	-323160	161912	125	385366
682941	15740	281835	66566	63397	-41178	-220919	-323160	126	667201
843958	161017	15740	281835	66566	63397	-41178	-220919	127	682941
615429	-228529	161017	15740	281835	66566	63397	-41178	128	843958
549998	-65431	-228529	161017	15740	281835	66566	63397	129	615429
468743	-81255	-65431	-228529	161017	15740	281835	66566	130	549998
792387	323644	-81255	-65431	-228529	161017	15740	281835	131	468743
528506	-263881	323644	-81255	-65431	-228529	161017	15740	132	792387
483221	-45285	-263881	323644	-81255	-65431	-228529	161017	133	528506
503311	20090	-45285	-263881	323644	-81255	-65431	-228529	134	483221
528668	25357	20090	-45285	-263881	323644	-81255	-65431	135	503311
651089	122421	25357	20090	-45285	-263881	323644	-81255	136	528668
571646	-79443	122421	25357	20090	-45285	-263881	323644	137	651089
799765	228119	-79443	122421	25357	20090	-45285	-263881	138	571646
641684	-158081	228119	-79443	122421	25357	20090	-45285	139	799765
557081	-84603	-158081	228119	-79443	122421	25357	20090	140	641684
619599	62518	-84603	-158081	228119	-79443	122421	25357	141	557081
529381	-90218	62518	-84603	-158081	228119	-79443	122421	142	619599
733149	203768	-90218	62518	-84603	-158081	228119	-79443	143	529381
597558	-135591	203768	-90218	62518	-84603	-158081	228119	144	733149
513852	-83706	-135591	203768	-90218	62518	-84603	-158081	145	597558
576438	62586	-83706	-135591	203768	-90218	62518	-84603	146	513852
534395	-42043	62586	-83706	-135591	203768	-90218	62518	147	576438
647790	113395	-42043	62586	-83706	-135591	203768	-90218	148	534395
1035563	387773	113395	-42043	62586	-83706	-135591	203768	149	647790
1084950	49387	387773	113395	-42043	62586	-83706	-135591	150	1035563

704662	-380288	49387	387773	113395	-42043	62586	-83706	151	1084950
725240	20578	-380288	49387	387773	113395	-42043	62586	152	704662
685244	-39996	20578	-380288	49387	387773	113395	-42043	153	725240
655962	-29282	-39996	20578	-380288	49387	387773	113395	154	685244
882026	226064	-29282	-39996	20578	-380288	49387	387773	155	655962
658308	-223718	226064	-29282	-39996	20578	-380288	49387	156	882026
520462	-137846	-223718	226064	-29282	-39996	20578	-380288	157	658308
618834	98372	-137846	-223718	226064	-29282	-39996	20578	158	520462
705710	86876	98372	-137846	-223718	226064	-29282	-39996	159	618834
646467	-59243	86876	98372	-137846	-223718	226064	-29282	160	705710
659718	13251	-59243	86876	98372	-137846	-223718	226064	161	646467
890368	230650	13251	-59243	86876	98372	-137846	-223718	162	659718
790323	-100045	230650	13251	-59243	86876	98372	-137846	163	890368
832026	41703	-100045	230650	13251	-59243	86876	98372	164	790323
732720	-99306	41703	-100045	230650	13251	-59243	86876	165	832026
741649	8929	-99306	41703	-100045	230650	13251	-59243	166	732720
939048	197399	8929	-99306	41703	-100045	230650	13251	167	741649
743456	-195592	197399	8929	-99306	41703	-100045	230650	168	939048
655719	-87737	-195592	197399	8929	-99306	41703	-100045	169	743456
762622	106903	-87737	-195592	197399	8929	-99306	41703	170	655719
777287	14665	106903	-87737	-195592	197399	8929	-99306	171	762622
682521	-94766	14665	106903	-87737	-195592	197399	8929	172	777287
1156151	473630	-94766	14665	106903	-87737	-195592	197399	173	682521
906347	-249804	473630	-94766	14665	106903	-87737	-195592	174	1156151
770364	-135983	-249804	473630	-94766	14665	106903	-87737	175	906347
774144	3780	-135983	-249804	473630	-94766	14665	106903	176	770364

762124	-12020	3780	-135983	-249804	473630	-94766	14665	177	774144
806397	44273	-12020	3780	-135983	-249804	473630	-94766	178	762124
960859	154462	44273	-12020	3780	-135983	-249804	473630	179	806397
793527	-167332	154462	44273	-12020	3780	-135983	-249804	180	960859
692113	-101414	-167332	154462	44273	-12020	3780	-135983	181	793527
787616	95503	-101414	-167332	154462	44273	-12020	3780	182	692113
795997	8381	95503	-101414	-167332	154462	44273	-12020	183	787616
656082	-139915	8381	95503	-101414	-167332	154462	44273	184	795997
1287877	631795	-139915	8381	95503	-101414	-167332	154462	185	656082
935930	-351947	631795	-139915	8381	95503	-101414	-167332	186	1287877
925360	-10570	-351947	631795	-139915	8381	95503	-101414	187	935930
812003	-113357	-10570	-351947	631795	-139915	8381	95503	188	925360
853007	41004	-113357	-10570	-351947	631795	-139915	8381	189	812003
852626	-381	41004	-113357	-10570	-351947	631795	-139915	190	853007
1152901	300275	-381	41004	-113357	-10570	-351947	631795	191	852626
879702	-273199	300275	-381	41004	-113357	-10570	-351947	192	1152901
721105	-158597	-273199	300275	-381	41004	-113357	-10570	193	879702
567452	-153653	-158597	-273199	300275	-381	41004	-113357	194	721105
175120	-392332	-153653	-158597	-273199	300275	-381	41004	195	567452
101948	-73172	-392332	-153653	-158597	-273199	300275	-381	196	175120
137395	35447	-73172	-392332	-153653	-158597	-273199	300275	197	101948
229112	91717	35447	-73172	-392332	-153653	-158597	-273199	198	137395
355732	126620	91717	35447	-73172	-392332	-153653	-158597	199	229112
283349	-72383	126620	91717	35447	-73172	-392332	-153653	200	355732
337304	53955	-72383	126620	91717	35447	-73172	-392332	201	283349
425097	87793	53955	-72383	126620	91717	35447	-73172	202	337304

382841	-42256	87793	53955	-72383	126620	91717	35447	203	425097
282248	-100593	-42256	87793	53955	-72383	126620	91717	204	382841
240608	-41640	-100593	-42256	87793	53955	-72383	126620	205	282248
305579	64971	-41640	-100593	-42256	87793	53955	-72383	206	240608
330593	25014	64971	-41640	-100593	-42256	87793	53955	207	305579
363959	33366	25014	64971	-41640	-100593	-42256	87793	208	330593
498852	134893	33366	25014	64971	-41640	-100593	-42256	209	363959
166718	-332134	134893	33366	25014	64971	-41640	-100593	210	498852
202187	35469	-332134	134893	33366	25014	64971	-41640	211	166718
298950	96763	35469	-332134	134893	33366	25014	64971	212	202187
468826	169876	96763	35469	-332134	134893	33366	25014	213	298950
513482	44656	169876	96763	35469	-332134	134893	33366	214	468826
629590	116108	44656	169876	96763	35469	-332134	134893	215	513482
527447	-102143	116108	44656	169876	96763	35469	-332134	216	629590
389690	-137757	-102143	116108	44656	169876	96763	35469	217	527447
547726	158036	-137757	-102143	116108	44656	169876	96763	218	389690
500740	-46986	158036	-137757	-102143	116108	44656	169876	219	547726
960692	459952	-46986	158036	-137757	-102143	116108	44656	220	500740
753907	-206785	459952	-46986	158036	-137757	-102143	116108	221	960692
784205	30298	-206785	459952	-46986	158036	-137757	-102143	222	753907
659567	-124638	30298	-206785	459952	-46986	158036	-137757	223	784205
622068	-37499	-124638	30298	-206785	459952	-46986	158036	224	659567
718066	95998	-37499	-124638	30298	-206785	459952	-46986	225	622068
657949	-60117	95998	-37499	-124638	30298	-206785	459952	226	718066
930917	272968	-60117	95998	-37499	-124638	30298	-206785	227	657949
720164	-210753	272968	-60117	95998	-37499	-124638	30298	228	930917

629282	-90882	-210753	272968	-60117	95998	-37499	-124638	229	720164
665751	36469	-90882	-210753	272968	-60117	95998	-37499	230	629282
900880	235129	36469	-90882	-210753	272968	-60117	95998	231	665751
943713	42833	235129	36469	-90882	-210753	272968	-60117	232	900880
883793	-59920	42833	235129	36469	-90882	-210753	272968	233	943713
898260	14467	-59920	42833	235129	36469	-90882	-210753	234	883793
712860	-185400	14467	-59920	42833	235129	36469	-90882	235	898260
755293	42433	-185400	14467	-59920	42833	235129	36469	236	712860
813745	58452	42433	-185400	14467	-59920	42833	235129	237	755293
749268	-64477	58452	42433	-185400	14467	-59920	42833	238	813745
1204902	455634	-64477	58452	42433	-185400	14467	-59920	239	749268

<i>Augmented (6 lag)</i>	<i>Coefficient</i>	-0.16446
	<i>Standart errorr</i>	0.05657
	<i>t_{statistic}</i>	-2.9072
	<i>Critical t-value</i>	-3.42

b. Dengan Bantuan R-Studio 4.4.2

```
Augmented Dickey-Fuller Test

data: train.ts
Dickey-Fuller = -2.9072, Lag order = 6, p-value = 0.1943
alternative hypothesis: stationary
```

Kesimpulan:

Berdasarkan hasil perhitungan pada uji *Augmented Dickey-Fuller* dengan 6 lag dan jumlah data sebanyak 239, diperoleh nilai koefisien sebesar -0.16446 dengan *standar error* 0.05657. Nilai $t_{statistic}$ yang dihasilkan adalah -2.9072. Jika dibandingkan dengan nilai t_{kritis} sebesar -3.42 pada taraf signifikansi 0,05, maka karena $t_{statistic} > t_{kritis}$ (-2.9072 > -3.42), maka keputusan uji adalah gagal menolak H_0 . Dengan demikian, dapat disimpulkan bahwa data masih mengandung akar unit (*non-stasioner*).



Lampiran 54 Hasil Uji ADF-Test Sesudah *Differencing*

a. Dengan Bantuan Microsoft Excel 2016

Y_t	<i>Diff</i>	<i>lag 1</i>	<i>lag 2</i>	<i>lag 3</i>	<i>lag 4</i>	<i>lag 5</i>	<i>lag 6</i>	<i>Timed trend</i>	<i>lagged</i>
-3.898									
-2.034	1.8640							1	-3.898
1.529	3.5630	1.8640						2	-2.034
1.563	0.0340	3.5630	1.8640					3	1.529
2.905	1.3420	0.0340	3.5630	1.8640				4	1.563
4.365	1.4600	1.3420	0.0340	3.5630	1.8640			5	2.905
-4.013	-8.3780	1.4600	1.3420	0.0340	3.5630	1.8640		6	4.365
-0.277	3.7360	-8.3780	1.4600	1.3420	0.0340	3.5630	1.8640	7	-4.013
-1.955	-1.6780	3.7360	-8.3780	1.4600	1.3420	0.0340	3.5630	8	-0.277
10.866	12.8210	-1.6780	3.7360	-8.3780	1.4600	1.3420	0.0340	9	-1.955
-5.063	-15.9290	12.8210	-1.6780	3.7360	-8.3780	1.4600	1.3420	10	10.866
-3.205	1.8580	-15.9290	12.8210	-1.6780	3.7360	-8.3780	1.4600	11	-5.063
-1.357	1.8480	1.8580	-15.9290	12.8210	-1.6780	3.7360	-8.3780	12	-3.205
3.338	4.6950	1.8480	1.8580	-15.9290	12.8210	-1.6780	3.7360	13	-1.357
-2.031	-5.3690	4.6950	1.8480	1.8580	-15.9290	12.8210	-1.6780	14	3.338
1.688	3.7190	-5.3690	4.6950	1.8480	1.8580	-15.9290	12.8210	15	-2.031
1.056	-0.6320	3.7190	-5.3690	4.6950	1.8480	1.8580	-15.9290	16	1.688
4.439	3.3830	-0.6320	3.7190	-5.3690	4.6950	1.8480	1.8580	17	1.056
-3.014	-7.4530	3.3830	-0.6320	3.7190	-5.3690	4.6950	1.8480	18	4.439
0.052	3.0660	-7.4530	3.3830	-0.6320	3.7190	-5.3690	4.6950	19	-3.014

-4.786	-4.8380	3.0660	-7.4530	3.3830	-0.6320	3.7190	-5.3690	20	0.052
8.156	12.9420	-4.8380	3.0660	-7.4530	3.3830	-0.6320	3.7190	21	-4.786
-5.77	-13.9260	12.9420	-4.8380	3.0660	-7.4530	3.3830	-0.6320	22	8.156
1.002	6.7720	-13.9260	12.9420	-4.8380	3.0660	-7.4530	3.3830	23	-5.77
-4.176	-5.1780	6.7720	-13.9260	12.9420	-4.8380	3.0660	-7.4530	24	1.002
1.116	5.2920	-5.1780	6.7720	-13.9260	12.9420	-4.8380	3.0660	25	-4.176
2.051	0.9350	5.2920	-5.1780	6.7720	-13.9260	12.9420	-4.8380	26	1.116
-0.391	-2.4420	0.9350	5.2920	-5.1780	6.7720	-13.9260	12.9420	27	2.051
1.532	1.9230	-2.4420	0.9350	5.2920	-5.1780	6.7720	-13.9260	28	-0.391
3.567	2.0350	1.9230	-2.4420	0.9350	5.2920	-5.1780	6.7720	29	1.532
-2.325	-5.8920	2.0350	1.9230	-2.4420	0.9350	5.2920	-5.1780	30	3.567
-2.001	0.3240	-5.8920	2.0350	1.9230	-2.4420	0.9350	5.2920	31	-2.325
3.745	5.7460	0.3240	-5.8920	2.0350	1.9230	-2.4420	0.9350	32	-2.001
-0.363	-4.1080	5.7460	0.3240	-5.8920	2.0350	1.9230	-2.4420	33	3.745
-1.139	-0.7760	-4.1080	5.7460	0.3240	-5.8920	2.0350	1.9230	34	-0.363
-3.7	-2.5610	-0.7760	-4.1080	5.7460	0.3240	-5.8920	2.0350	35	-1.139
-4.042	-0.3420	-2.5610	-0.7760	-4.1080	5.7460	0.3240	-5.8920	36	-3.7
1.906	5.9480	-0.3420	-2.5610	-0.7760	-4.1080	5.7460	0.3240	37	-4.042
0.491	-1.4150	5.9480	-0.3420	-2.5610	-0.7760	-4.1080	5.7460	38	1.906
1.892	1.4010	-1.4150	5.9480	-0.3420	-2.5610	-0.7760	-4.1080	39	0.491
2.933	1.0410	1.4010	-1.4150	5.9480	-0.3420	-2.5610	-0.7760	40	1.892
2.453	-0.4800	1.0410	1.4010	-1.4150	5.9480	-0.3420	-2.5610	41	2.933
-2.2	-4.6530	-0.4800	1.0410	1.4010	-1.4150	5.9480	-0.3420	42	2.453
-3.375	-1.1750	-4.6530	-0.4800	1.0410	1.4010	-1.4150	5.9480	43	-2.2
9.712	13.0870	-1.1750	-4.6530	-0.4800	1.0410	1.4010	-1.4150	44	-3.375

-7.526	-17.2380	13.0870	-1.1750	-4.6530	-0.4800	1.0410	1.4010	45	9.712
6.547	14.0730	-17.2380	13.0870	-1.1750	-4.6530	-0.4800	1.0410	46	-7.526
-4.65424	-11.2012	14.0730	-17.2380	13.0870	-1.1750	-4.6530	-0.4800	47	6.547
-3.1949	1.4593	-11.2012	14.0730	-17.2380	13.0870	-1.1750	-4.6530	48	-4.65424
2.78437	5.9793	1.4593	-11.2012	14.0730	-17.2380	13.0870	-1.1750	49	-3.1949
-1.29421	-4.0786	5.9793	1.4593	-11.2012	14.0730	-17.2380	13.0870	50	2.78437
1.73747	3.0317	-4.0786	5.9793	1.4593	-11.2012	14.0730	-17.2380	51	-1.29421
2.44457	0.7071	3.0317	-4.0786	5.9793	1.4593	-11.2012	14.0730	52	1.73747
5.12399	2.6794	0.7071	3.0317	-4.0786	5.9793	1.4593	-11.2012	53	2.44457
-4.88775	-10.0117	2.6794	0.7071	3.0317	-4.0786	5.9793	1.4593	54	5.12399
-4.53973	0.3480	-10.0117	2.6794	0.7071	3.0317	-4.0786	5.9793	55	-4.88775
7.89646	12.4362	0.3480	-10.0117	2.6794	0.7071	3.0317	-4.0786	56	-4.53973
-8.07028	-15.9667	12.4362	0.3480	-10.0117	2.6794	0.7071	3.0317	57	7.89646
5.33803	13.4083	-15.9667	12.4362	0.3480	-10.0117	2.6794	0.7071	58	-8.07028
-0.21281	-5.5508	13.4083	-15.9667	12.4362	0.3480	-10.0117	2.6794	59	5.33803
-5.03272	-4.8199	-5.5508	13.4083	-15.9667	12.4362	0.3480	-10.0117	60	-0.21281
4.28818	9.3209	-4.8199	-5.5508	13.4083	-15.9667	12.4362	0.3480	61	-5.03272
-0.63786	-4.9260	9.3209	-4.8199	-5.5508	13.4083	-15.9667	12.4362	62	4.28818
3.18803	3.8259	-4.9260	9.3209	-4.8199	-5.5508	13.4083	-15.9667	63	-0.63786
1.01052	-2.1775	3.8259	-4.9260	9.3209	-4.8199	-5.5508	13.4083	64	3.18803
2.37128	1.3608	-2.1775	3.8259	-4.9260	9.3209	-4.8199	-5.5508	65	1.01052
-4.00076	-6.3720	1.3608	-2.1775	3.8259	-4.9260	9.3209	-4.8199	66	2.37128
4.71877	8.7195	-6.3720	1.3608	-2.1775	3.8259	-4.9260	9.3209	67	-4.00076
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-3.02463	-1.6577	-6.0858	8.7195	-6.3720	1.3608	-2.1775	3.8259	69	-1.36698

5.21291	8.2375	-1.6577	-6.0858	8.7195	-6.3720	1.3608	-2.1775	70	-3.02463
-0.98503	-6.1979	8.2375	-1.6577	-6.0858	8.7195	-6.3720	1.3608	71	5.21291
-7.79507	-6.8100	-6.1979	8.2375	-1.6577	-6.0858	8.7195	-6.3720	72	-0.98503
-3.11079	4.6843	-6.8100	-6.1979	8.2375	-1.6577	-6.0858	8.7195	73	-7.79507
13.66488	16.7757	4.6843	-6.8100	-6.1979	8.2375	-1.6577	-6.0858	74	-3.11079
1.3296	-12.3353	16.7757	4.6843	-6.8100	-6.1979	8.2375	-1.6577	75	13.66488
1.75753	0.4279	-12.3353	16.7757	4.6843	-6.8100	-6.1979	8.2375	76	1.3296
1.64905	-0.1085	0.4279	-12.3353	16.7757	4.6843	-6.8100	-6.1979	77	1.75753
-5.83111	-7.4802	-0.1085	0.4279	-12.3353	16.7757	4.6843	-6.8100	78	1.64905
10.46284	16.2940	-7.4802	-0.1085	0.4279	-12.3353	16.7757	4.6843	79	-5.83111
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-1.75531	7.9018	-20.1199	16.2940	-7.4802	-0.1085	0.4279	-12.3353	81	-9.65709
0.30932	2.0646	7.9018	-20.1199	16.2940	-7.4802	-0.1085	0.4279	82	-1.75531
-5.60666	-5.9160	2.0646	7.9018	-20.1199	16.2940	-7.4802	-0.1085	83	0.30932
4.02216	9.6288	-5.9160	2.0646	7.9018	-20.1199	16.2940	-7.4802	84	-5.60666
1.09061	-2.9316	9.6288	-5.9160	2.0646	7.9018	-20.1199	16.2940	85	4.02216
1.57294	0.4823	-2.9316	9.6288	-5.9160	2.0646	7.9018	-20.1199	86	1.09061
4.14097	2.5680	0.4823	-2.9316	9.6288	-5.9160	2.0646	7.9018	87	1.57294
4.78511	0.6441	2.5680	0.4823	-2.9316	9.6288	-5.9160	2.0646	88	4.14097
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7.63258	13.7650	-6.3366	-4.5810	0.6441	2.5680	0.4823	-2.9316	91	-6.13244
-3.53218	-11.1648	13.7650	-6.3366	-4.5810	0.6441	2.5680	0.4823	92	7.63258
2.07041	5.6026	-11.1648	13.7650	-6.3366	-4.5810	0.6441	2.5680	93	-3.53218
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-11.4819	-10.6714	-2.8809	5.6026	-11.1648	13.7650	-6.3366	-4.5810	95	-0.81046
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0.11372	1.9015	9.6941	-10.6714	-2.8809	5.6026	-11.1648	13.7650	97	-1.78778
1.5582	1.4445	1.9015	9.6941	-10.6714	-2.8809	5.6026	-11.1648	98	0.11372
10.2828	8.7246	1.4445	1.9015	9.6941	-10.6714	-2.8809	5.6026	99	1.5582
1.94094	-8.3419	8.7246	1.4445	1.9015	9.6941	-10.6714	-2.8809	100	10.2828
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5.63107	7.6054	-3.9152	-8.3419	8.7246	1.4445	1.9015	9.6941	102	-1.9743
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3.78122	7.3231	-9.1730	7.6054	-3.9152	-8.3419	8.7246	1.4445	104	-3.54191
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6.8286	11.7677	-8.7203	7.3231	-9.1730	7.6054	-3.9152	-8.3419	106	-4.93907
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3.42059	6.5774	9.3632	-19.3486	11.7677	-8.7203	7.3231	-9.1730	109	-3.1568
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13.21209	10.4220	4.2986	-4.9291	6.5774	9.3632	-19.3486	11.7677	112	2.79007
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15.26786	27.5800	-25.5242	10.4220	4.2986	-4.9291	6.5774	9.3632	114	-12.3121
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11.46852	26.7884	-30.5878	27.5800	-25.5242	10.4220	4.2986	-4.9291	116	-15.3199
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4.5201	7.5409	9.2328	-0.1540	-17.6089	8.3297	-14.2890	26.7884	122	-3.02082
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8.008	11.7997	-6.3702	6.0205	2.1574	-14.0213	11.6051	-8.2313	142	-3.79172
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2.73556	6.3432	1.4941	-13.1098	11.7997	-6.3702	6.0205	2.1574	145	-3.60766
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12.32309	7.6562	6.4779	-4.5466	6.3432	1.4941	-13.1098	11.7997	148	4.66691
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0.73143	12.2461	-12.8159	-11.0219	7.6562	6.4779	-4.5466	6.3432	151	-11.5147
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-5.69144	1.8587	-15.1892	8.7319	0.3439	-2.1681	12.2461	-12.8159	156	-7.55017
4.16231	9.8538	1.8587	-15.1892	8.7319	0.3439	-2.1681	12.2461	157	-5.69144
3.27589	-0.8864	9.8538	1.8587	-15.1892	8.7319	0.3439	-2.1681	158	4.16231
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0.50452	2.7025	-5.4739	-0.8864	9.8538	1.8587	-15.1892	8.7319	160	-2.19796
7.74871	7.2442	2.7025	-5.4739	-0.8864	9.8538	1.8587	-15.1892	161	0.50452
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1.34681	4.4942	-10.8961	7.2442	2.7025	-5.4739	-0.8864	9.8538	163	-3.1474
-3.29892	-4.6457	4.4942	-10.8961	7.2442	2.7025	-5.4739	-0.8864	164	1.34681
0.31006	3.6090	-4.6457	4.4942	-10.8961	7.2442	2.7025	-5.4739	165	-3.29892
6.22442	5.9144	3.6090	-4.6457	4.4942	-10.8961	7.2442	2.7025	166	0.31006
-6.16202	-12.3864	5.9144	3.6090	-4.6457	4.4942	-10.8961	7.2442	167	6.22442
-3.1731	2.9889	-12.3864	5.9144	3.6090	-4.6457	4.4942	-10.8961	168	-6.16202
3.82799	7.0011	2.9889	-12.3864	5.9144	3.6090	-4.6457	4.4942	169	-3.1731

0.49269	-3.3353	7.0011	2.9889	-12.3864	5.9144	3.6090	-4.6457	170	3.82799
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14.119	17.4378	-3.8115	-3.3353	7.0011	2.9889	-12.3864	5.9144	172	-3.31878
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0.12671	4.4153	2.4547	-20.8623	17.4378	-3.8115	-3.3353	7.0011	175	-4.28862
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4.68165	3.2147	1.8716	-0.5313	4.4153	2.4547	-20.8623	17.4378	178	1.46699
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3.31029	6.8152	1.5967	-9.7833	3.2147	1.8716	-0.5313	4.4153	181	-3.50493
0.27564	-3.0347	6.8152	1.5967	-9.7833	3.2147	1.8716	-0.5313	182	3.31029
-4.92534	-5.2010	-3.0347	6.8152	1.5967	-9.7833	3.2147	1.8716	183	0.27564
18.22439	23.1497	-5.2010	-3.0347	6.8152	1.5967	-9.7833	3.2147	184	-4.92534
-8.99324	-27.2176	23.1497	-5.2010	-3.0347	6.8152	1.5967	-9.7833	185	18.22439
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1.29834	4.7763	-3.1705	8.6858	-27.2176	23.1497	-5.2010	-3.0347	188	-3.47798
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8.29466	8.3065	-1.3102	4.7763	-3.1705	8.6858	-27.2176	23.1497	190	-0.01184
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-5.18482	2.2780	-15.7575	8.3065	-1.3102	4.7763	-3.1705	8.6858	192	-7.46284
-5.92966	-0.7448	2.2780	-15.7575	8.3065	-1.3102	4.7763	-3.1705	193	-5.18482
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-9.19845	15.4281	-18.6968	-0.7448	2.2780	-15.7575	8.3065	-1.3102	195	-24.6265
4.92549	14.1239	15.4281	-18.6968	-0.7448	2.2780	-15.7575	8.3065	196	-9.19845
9.3058	4.3803	14.1239	15.4281	-18.6968	-0.7448	2.2780	-15.7575	197	4.92549
8.9735	-0.3323	4.3803	14.1239	15.4281	-18.6968	-0.7448	2.2780	198	9.3058
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3.62229	8.3805	-13.7317	-0.3323	4.3803	14.1239	15.4281	-18.6968	200	-4.75823
5.04748	1.4252	8.3805	-13.7317	-0.3323	4.3803	14.1239	15.4281	201	3.62229
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4.81395	7.9977	3.2461	-4.1107	-7.3666	1.4252	8.3805	-13.7317	205	-3.18375
1.64588	-3.1681	7.9977	3.2461	-4.1107	-7.3666	1.4252	8.3805	206	4.81395
2.05407	0.4082	-3.1681	7.9977	3.2461	-4.1107	-7.3666	1.4252	207	1.64588
7.07728	5.0232	0.4082	-3.1681	7.9977	3.2461	-4.1107	-7.3666	208	2.05407
-22.4625	-29.5398	5.0232	0.4082	-3.1681	7.9977	3.2461	-4.1107	209	7.07728
3.53732	25.9998	-29.5398	5.0232	0.4082	-3.1681	7.9977	3.2461	210	-22.4625
7.69469	4.1574	25.9998	-29.5398	5.0232	0.4082	-3.1681	7.9977	211	3.53732
9.7943	2.0996	4.1574	25.9998	-29.5398	5.0232	0.4082	-3.1681	212	7.69469
2.1123	-7.6820	2.0996	4.1574	25.9998	-29.5398	5.0232	0.4082	213	9.7943
4.90357	2.7913	-7.6820	2.0996	4.1574	25.9998	-29.5398	5.0232	214	2.1123
-4.27174	-9.1753	2.7913	-7.6820	2.0996	4.1574	25.9998	-29.5398	215	4.90357
-6.89686	-2.6251	-9.1753	2.7913	-7.6820	2.0996	4.1574	25.9998	216	-4.27174
7.7921	14.6890	-2.6251	-9.1753	2.7913	-7.6820	2.0996	4.1574	217	-6.89686
-2.11507	-9.9072	14.6890	-2.6251	-9.1753	2.7913	-7.6820	2.0996	218	7.7921
16.45376	18.5688	-9.9072	14.6890	-2.6251	-9.1753	2.7913	-7.6820	219	-2.11507

-6.42326	-22.8770	18.5688	-9.9072	14.6890	-2.6251	-9.1753	2.7913	220	16.45376
1.01889	7.4422	-22.8770	18.5688	-9.9072	14.6890	-2.6251	-9.1753	221	-6.42326
-4.40493	-5.4238	7.4422	-22.8770	18.5688	-9.9072	14.6890	-2.6251	222	1.01889
-1.44872	2.9562	-5.4238	7.4422	-22.8770	18.5688	-9.9072	14.6890	223	-4.40493
3.58848	5.0372	2.9562	-5.4238	7.4422	-22.8770	18.5688	-9.9072	224	-1.44872
-2.20095	-5.7894	5.0372	2.9562	-5.4238	7.4422	-22.8770	18.5688	225	3.58848
9.01489	11.2158	-5.7894	5.0372	2.9562	-5.4238	7.4422	-22.8770	226	-2.20095
-6.7397	-15.7546	11.2158	-5.7894	5.0372	2.9562	-5.4238	7.4422	227	9.01489
-3.37895	3.3608	-15.7546	11.2158	-5.7894	5.0372	2.9562	-5.4238	228	-6.7397
1.39781	4.7768	3.3608	-15.7546	11.2158	-5.7894	5.0372	2.9562	229	-3.37895
7.83638	6.4386	4.7768	3.3608	-15.7546	11.2158	-5.7894	5.0372	230	1.39781
1.25467	-6.5817	6.4386	4.7768	3.3608	-15.7546	11.2158	-5.7894	231	7.83638
-1.76785	-3.0225	-6.5817	6.4386	4.7768	3.3608	-15.7546	11.2158	232	1.25467
0.43498	2.2028	-3.0225	-6.5817	6.4386	4.7768	3.3608	-15.7546	233	-1.76785
-6.03621	-6.4712	2.2028	-3.0225	-6.5817	6.4386	4.7768	3.3608	234	0.43498
1.4785	7.5147	-6.4712	2.2028	-3.0225	-6.5817	6.4386	4.7768	235	-6.03621
1.93658	0.4581	7.5147	-6.4712	2.2028	-3.0225	-6.5817	6.4386	236	1.4785
-2.1426	-4.0792	0.4581	7.5147	-6.4712	2.2028	-3.0225	-6.5817	237	1.93658
12.93157	15.0742	-4.0792	0.4581	7.5147	-6.4712	2.2028	-3.0225	238	-2.1426

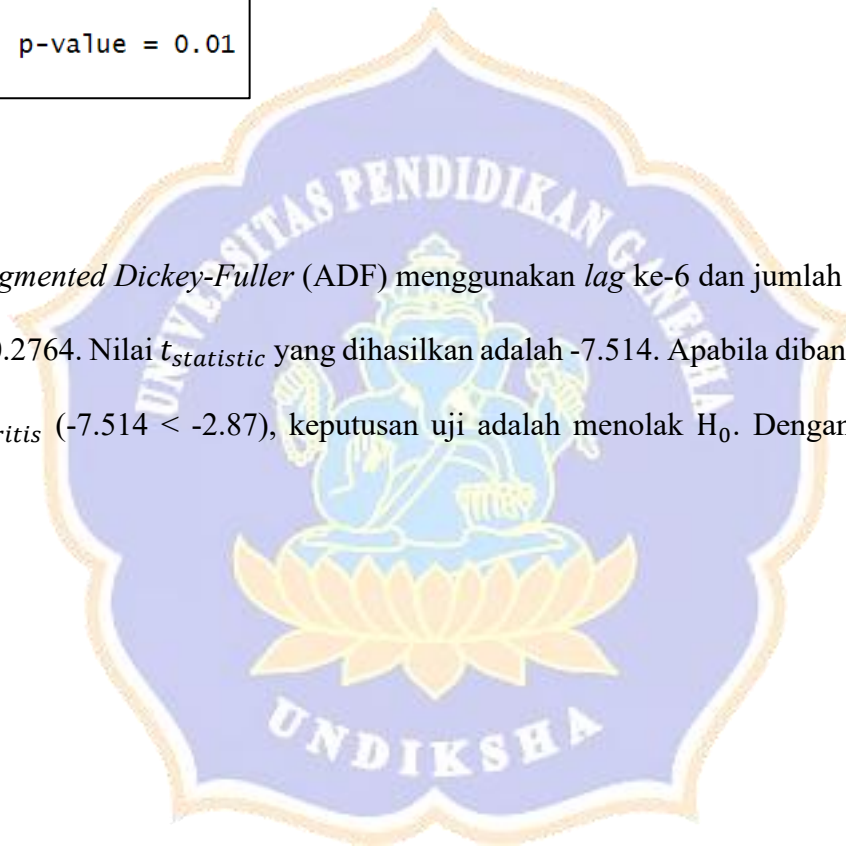
Augmented (6 lag)	Coefficient	-2.07694
	Standart error	0.2764
	$t_{\text{statistic}}$	-7.514
	Critical t -value	-2.87

b. Dengan Bantuan R-Studio 4.4.2

```
Augmented Dickey-Fuller Test  
data: train.diff  
Dickey-Fuller = -7.5142, Lag order = 6, p-value = 0.01  
alternative hypothesis: stationary
```

Kesimpulan:

Berdasarkan hasil pengujian dengan metode *Augmented Dickey-Fuller* (ADF) menggunakan *lag* ke-6 dan jumlah observasi sebanyak 239, diperoleh nilai koefisien sebesar -2.07694 dengan *standar error* sebesar 0.2764. Nilai $t_{statistic}$ yang dihasilkan adalah -7.514. Apabila dibandingkan dengan nilai t_{kritis} pada taraf signifikansi 5% sebesar -2.87, maka karena $t_{statistic} < t_{kritis}$ ($-7.514 < -2.87$), keputusan uji adalah menolak H_0 . Dengan demikian, dapat disimpulkan bahwa data tidak mengandung akar unit dan bersifat stasioner.



Lampiran 55 Hasil Uji *White Noise* pada Residual ARIMA(2,1,4)

a. Dengan Bantuan Microsoft Excel 2016

Residual	lag 0	lag 1	lag 2	lag 3	lag 4	lag 6	lag 7	lag 8	lag 9	lag 10	lag 11	lag 12	lag 13	lag 14	lag 15
*															
0.0	0.0														
1.1	1.2	0.0													
3.5	12.3	3.9	0.1												
2.7	7.3	9.5	3.0	0.1											
2.6	6.8	7.0	9.1	2.9	0.1										
3.7	14.1	9.8	10.1	13.1	4.1	0.1									
-3.0	8.8	-11.1	-7.7	-8.0	-10.4	-3.3	-0.1								
-0.4	0.1	1.1	-1.4	-1.0	-1.0	-1.3	-0.4	0.0							
-0.8	0.5	0.3	2.2	-2.8	-1.9	-2.0	-2.6	-0.8	0.0						
9.7	94.1	-7.2	-3.7	-28.8	36.4	25.2	26.2	34.0	10.7	0.3					
-3.9	14.9	-37.4	2.9	1.5	11.4	-14.4	-10.0	-10.4	-13.5	-4.3	-0.1				
-5.9	34.6	22.7	-57.0	4.4	2.2	17.5	-22.0	-15.3	-15.9	-20.6	-6.5	-0.2			
-1.6	2.5	9.4	6.1	-15.5	1.2	0.6	4.7	-6.0	-4.1	-4.3	-5.6	-1.8	0.0		
4.0	16.0	-6.4	-23.5	-15.4	38.8	-3.0	-1.5	-11.9	15.0	10.4	10.8	14.0	4.4	0.1	
-2.0	3.9	-7.9	3.2	11.7	7.6	-19.2	1.5	0.8	5.9	-7.4	-5.2	-5.3	-6.9	-2.2	-0.1
-1.3	1.5	2.4	-4.9	2.0	7.3	4.8	-12.0	0.9	0.5	3.7	-4.6	-3.2	-3.3	-4.3	-1.4
0.1	0.0	-0.1	-0.2	0.5	-0.2	-0.7	-0.4	1.1	-0.1	0.0	-0.3	0.4	0.3	0.3	0.4
4.5	20.8	0.5	-5.6	-9.0	18.2	-7.3	-26.8	-17.6	44.2	-3.4	-1.7	-13.5	17.1	11.8	12.3
-1.7	2.6	-7.4	-0.2	2.0	3.2	-6.5	2.6	9.5	6.3	-15.7	1.2	0.6	4.8	-6.1	-4.2
-0.9	0.8	1.5	-4.2	-0.1	1.1	1.8	-3.7	1.5	5.4	3.5	-8.9	0.7	0.4	2.7	-3.4

-4.6	20.5	4.2	7.4	-20.6	-0.5	5.6	9.0	-18.1	7.2	26.6	17.5	-43.9	3.4	1.7	13.5
6.6	44.3	-30.2	-6.1	-10.8	30.3	0.8	-8.2	-13.2	26.6	-10.6	-39.1	-25.7	64.6	-4.9	-2.5
-4.2	17.0	-27.5	18.7	3.8	6.7	-18.8	-0.5	5.1	8.2	-16.5	6.6	24.3	15.9	-40.0	3.1
-2.1	4.2	8.4	-13.6	9.3	1.9	3.3	-9.3	-0.2	2.5	4.1	-8.2	3.3	12.0	7.9	-19.9
-4.6	20.7	9.3	18.8	-30.3	20.6	4.2	7.4	-20.7	-0.5	5.6	9.0	-18.2	7.2	26.7	17.5
-0.2	0.0	0.6	0.3	0.6	-0.9	0.6	0.1	0.2	-0.6	0.0	0.2	0.3	-0.5	0.2	0.8
1.5	2.4	-0.2	-7.0	-3.2	-6.4	10.3	-7.0	-1.4	-2.5	7.0	0.2	-1.9	-3.1	6.2	-2.5
-1.5	2.1	-2.2	0.2	6.5	2.9	5.9	-9.6	6.5	1.3	2.3	-6.6	-0.2	1.8	2.9	-5.8
-0.2	0.0	0.2	-0.2	0.0	0.6	0.3	0.6	-0.9	0.6	0.1	0.2	-0.6	0.0	0.2	0.3
3.5	12.8	-0.5	-5.2	5.5	-0.5	-16.3	-7.3	-14.8	23.8	-16.2	-3.3	-5.8	16.3	0.4	-4.4
-0.9	0.7	-3.0	0.1	1.2	-1.3	0.1	3.8	1.7	3.4	-5.5	3.8	0.8	1.3	-3.8	-0.1
-2.3	5.0	1.9	-8.0	0.3	3.2	-3.5	0.3	10.2	4.6	9.3	-15.0	10.2	2.1	3.6	-10.2
3.4	11.7	-7.7	-2.8	12.2	-0.5	-4.9	5.3	-0.5	-15.6	-7.0	-14.1	22.8	-15.5	-3.1	-5.6
0.8	0.7	2.8	-1.8	-0.7	2.9	-0.1	-1.2	1.3	-0.1	-3.7	-1.7	-3.4	5.5	-3.7	-0.8
-1.8	3.0	-1.4	-5.9	3.9	1.4	-6.2	0.2	2.5	-2.7	0.2	7.8	3.5	7.1	-11.5	7.8
-4.4	19.2	7.5	-3.6	-15.0	9.8	3.6	-15.7	0.6	6.3	-6.8	0.6	19.9	9.0	18.1	-29.1
-5.0	24.4	21.6	8.5	-4.1	-16.9	11.1	4.1	-17.7	0.7	7.1	-7.6	0.7	22.5	10.1	20.4
0.4	0.2	-1.9	-1.7	-0.7	0.3	1.3	-0.9	-0.3	1.4	-0.1	-0.6	0.6	-0.1	-1.8	-0.8
-0.5	0.2	-0.2	2.4	2.1	0.8	-0.4	-1.7	1.1	0.4	-1.7	0.1	0.7	-0.7	0.1	2.2
-0.4	0.1	0.2	-0.1	1.8	1.6	0.6	-0.3	-1.2	0.8	0.3	-1.3	0.1	0.5	-0.6	0.0
1.7	3.0	-0.6	-0.8	0.7	-8.5	-7.5	-3.0	1.4	5.9	-3.9	-1.4	6.2	-0.2	-2.5	2.7
3.1	9.7	5.4	-1.1	-1.5	1.2	-15.4	-13.6	-5.4	2.6	10.7	-7.0	-2.6	11.1	-0.4	-4.5
-0.7	0.4	-2.0	-1.1	0.2	0.3	-0.3	3.2	2.8	1.1	-0.5	-2.2	1.4	0.5	-2.3	0.1
-3.0	8.6	1.9	-9.2	-5.1	1.1	1.4	-1.2	14.5	12.9	5.1	-2.4	-10.1	6.6	2.4	-10.5

9.4	89.2	-27.8	-6.1	29.4	16.3	-3.4	-4.6	3.7	-46.7	-41.3	-16.3	7.7	32.3	-21.2	-7.8
-4.3	18.2	-40.3	12.6	2.7	-13.3	-7.4	1.5	2.1	-1.7	21.1	18.7	7.4	-3.5	-14.6	9.6
3.8	14.9	-16.5	36.5	-11.4	-2.5	12.0	6.7	-1.4	-1.9	1.5	-19.1	-16.9	-6.7	3.2	13.2
-2.5	6.1	-9.5	10.5	-23.3	7.2	1.6	-7.7	-4.2	0.9	1.2	-1.0	12.2	10.8	4.2	-2.0
-3.6	13.1	8.9	-14.0	15.4	-34.1	10.6	2.3	-11.3	-6.2	1.3	1.7	-1.4	17.9	15.8	6.2
2.1	4.5	-7.7	-5.2	8.2	-9.1	20.1	-6.3	-1.4	6.6	3.7	-0.8	-1.0	0.8	-10.5	-9.3
-0.9	0.8	-1.9	3.3	2.2	-3.5	3.9	-8.5	2.7	0.6	-2.8	-1.6	0.3	0.4	-0.4	4.5
-0.1	0.0	0.0	-0.1	0.2	0.1	-0.2	0.2	-0.4	0.1	0.0	-0.1	-0.1	0.0	0.0	0.0
1.7	3.1	-0.1	-1.6	3.7	-6.3	-4.3	6.8	-7.5	16.5	-5.1	-1.1	5.4	3.0	-0.6	-0.8
5.6	31.7	9.8	-0.2	-5.1	12.0	-20.4	-13.9	21.8	-24.1	53.2	-16.6	-3.6	17.5	9.7	-2.0
-2.8	7.8	-15.7	-4.9	0.1	2.5	-5.9	10.1	6.9	-10.8	11.9	-26.3	8.2	1.8	-8.7	-4.8
-5.1	25.5	14.1	-28.5	-8.8	0.2	4.6	-10.8	18.3	12.4	-19.5	21.6	-47.7	14.9	3.2	-15.7
7.5	56.0	-37.8	-20.9	42.2	13.1	-0.3	-6.8	15.9	-27.0	-18.4	28.9	-32.0	70.7	-22.0	-4.8
-5.3	28.2	-39.8	26.8	14.8	-29.9	-9.3	0.2	4.8	-11.3	19.2	13.1	-20.5	22.7	-50.2	15.6
1.7	2.9	-9.1	12.8	-8.6	-4.8	9.6	3.0	-0.1	-1.5	3.6	-6.2	-4.2	6.6	-7.3	16.1
0.2	0.1	0.4	-1.4	1.9	-1.3	-0.7	1.5	0.5	0.0	-0.2	0.5	-0.9	-0.6	1.0	-1.1
-5.2	27.1	-1.3	-8.9	27.7	-39.0	26.3	14.5	-29.4	-9.1	0.2	4.7	-11.1	18.8	12.8	-20.1
2.6	6.8	-13.6	0.7	4.5	-13.8	19.5	-13.2	-7.3	14.7	4.6	-0.1	-2.4	5.6	-9.4	-6.4
0.4	0.2	1.2	-2.5	0.1	0.8	-2.5	3.6	-2.4	-1.3	2.7	0.8	0.0	-0.4	1.0	-1.7
2.2	5.0	1.1	5.8	-11.7	0.6	3.8	-11.9	16.8	-11.3	-6.2	12.6	3.9	-0.1	-2.0	4.8
1.1	1.3	2.6	0.5	3.0	-6.0	0.3	2.0	-6.1	8.6	-5.8	-3.2	6.5	2.0	0.0	-1.0
2.8	7.9	3.2	6.3	1.3	7.3	-14.6	0.7	4.8	-14.9	21.0	-14.2	-7.8	15.8	4.9	-0.1
-2.3	5.3	-6.5	-2.7	-5.2	-1.1	-6.0	12.0	-0.6	-3.9	12.2	-17.2	11.6	6.4	-13.0	-4.0
4.5	20.9	-10.5	12.9	5.3	10.2	2.2	11.9	-23.8	1.2	7.8	-24.3	34.2	-23.1	-12.8	25.8

0.7	0.6	3.5	-1.8	2.2	0.9	1.7	0.4	2.0	-4.0	0.2	1.3	-4.1	5.7	-3.9	-2.1
-3.3	10.9	-2.5	-15.1	7.6	-9.3	-3.8	-7.4	-1.6	-8.6	17.2	-0.9	-5.6	17.5	-24.7	16.7
4.1	16.9	-13.6	3.2	18.8	-9.5	11.6	4.7	9.2	2.0	10.7	-21.4	1.1	7.0	-21.9	30.8
0.8	0.6	3.2	-2.6	0.6	3.6	-1.8	2.2	0.9	1.7	0.4	2.0	-4.1	0.2	1.3	-4.1
-8.1	65.1	-6.3	-33.2	26.6	-6.2	-36.9	18.6	-22.7	-9.3	-18.1	-3.8	-21.0	42.0	-2.1	-13.8
-5.8	32.8	46.2	-4.5	-23.6	18.9	-4.4	-26.2	13.2	-16.1	-6.6	-12.8	-2.7	-14.9	29.8	-1.5
12.2	148.6	-69.8	-98.4	9.5	50.2	-40.2	9.3	55.7	-28.1	34.3	14.0	27.3	5.8	31.8	-63.5
4.0	15.9	48.6	-22.8	-32.1	3.1	16.4	-13.1	3.1	18.2	-9.2	11.2	4.6	8.9	1.9	10.4
0.1	0.0	0.5	1.5	-0.7	-1.0	0.1	0.5	-0.4	0.1	0.6	-0.3	0.3	0.1	0.3	0.1
2.4	5.9	0.3	9.7	29.6	-13.9	-19.6	1.9	10.0	-8.0	1.9	11.1	-5.6	6.8	2.8	5.4
-2.1	4.1	-4.9	-0.2	-8.1	-24.7	11.6	16.3	-1.6	-8.3	6.7	-1.6	-9.2	4.7	-5.7	-2.3
11.6	134.1	-23.4	28.1	1.4	46.1	141.2	-66.3	-93.5	9.0	47.7	-38.2	8.9	53.0	-26.7	32.6
-5.6	30.7	-64.2	11.2	-13.4	-0.7	-22.1	-67.5	31.7	44.7	-4.3	-22.8	18.3	-4.2	-25.3	12.8
-5.2	27.2	28.9	-60.4	10.5	-12.6	-0.6	-20.8	-63.6	29.9	42.1	-4.1	-21.5	17.2	-4.0	-23.8
-0.6	0.3	2.7	2.9	-6.1	1.1	-1.3	-0.1	-2.1	-6.4	3.0	4.2	-0.4	-2.2	1.7	-0.4
-5.4	28.8	2.8	28.0	29.7	-62.1	10.9	-13.0	-0.7	-21.4	-65.4	30.7	43.3	-4.2	-22.1	17.7
0.7	0.6	-4.1	-0.4	-4.0	-4.2	8.8	-1.5	1.8	0.1	3.0	9.3	-4.4	-6.1	0.6	3.1
-0.3	0.1	-0.2	1.5	0.1	1.4	1.5	-3.2	0.6	-0.7	0.0	-1.1	-3.3	1.6	2.2	-0.2
-0.4	0.1	0.1	-0.3	1.8	0.2	1.7	1.8	-3.8	0.7	-0.8	0.0	-1.3	-4.0	1.9	2.7
3.4	11.9	-1.1	-0.9	2.6	-18.5	-1.8	-18.0	-19.1	39.9	-7.0	8.4	0.4	13.7	42.0	-19.8
6.2	39.2	21.6	-2.1	-1.7	4.8	-33.6	-3.3	-32.6	-34.7	72.5	-12.7	15.2	0.8	24.9	76.3
2.6	6.9	16.4	9.0	-0.9	-0.7	2.0	-14.1	-1.4	-13.7	-14.5	30.3	-5.3	6.3	0.3	10.4
-4.7	21.8	-12.2	-29.2	-16.1	1.5	1.3	-3.5	25.0	2.4	24.3	25.8	-54.0	9.4	-11.3	-0.6
7.4	55.4	-34.7	19.5	46.6	25.7	-2.5	-2.0	5.7	-39.9	-3.9	-38.8	-41.2	86.2	-15.1	18.0

0.2	0.1	1.8	-1.1	0.6	1.5	0.8	-0.1	-0.1	0.2	-1.3	-0.1	-1.2	-1.3	2.8	-0.5
1.1	1.3	0.3	8.3	-5.2	2.9	7.0	3.9	-0.4	-0.3	0.9	-6.0	-0.6	-5.8	-6.2	13.0
-0.6	0.4	-0.7	-0.1	-4.5	2.8	-1.6	-3.8	-2.1	0.2	0.2	-0.5	3.2	0.3	3.1	3.3
-11.4	128.6	6.8	-12.7	-2.7	-84.4	52.9	-29.7	-71.0	-39.1	3.8	3.1	-8.6	60.8	5.9	59.1
-5.2	26.7	58.5	3.1	-5.8	-1.2	-38.4	24.1	-13.5	-32.3	-17.8	1.7	1.4	-3.9	27.7	2.7
-1.6	2.5	8.2	18.1	1.0	-1.8	-0.4	-11.9	7.4	-4.2	-10.0	-5.5	0.5	0.4	-1.2	8.5
-1.7	2.9	2.7	8.8	19.3	1.0	-1.9	-0.4	-12.6	7.9	-4.4	-10.6	-5.9	0.6	0.5	-1.3
6.2	38.3	-10.5	-9.9	-32.0	-70.2	-3.7	6.9	1.5	46.1	-28.9	16.2	38.7	21.3	-2.1	-1.7
2.2	4.9	13.6	-3.7	-3.5	-11.4	-25.0	-1.3	2.5	0.5	16.4	-10.3	5.8	13.8	7.6	-0.7
-1.4	1.8	-2.9	-8.2	2.3	2.1	6.9	15.1	0.8	-1.5	-0.3	-9.9	6.2	-3.5	-8.3	-4.6
7.2	52.2	-9.6	15.9	44.7	-12.3	-11.5	-37.3	-82.0	-4.3	8.1	1.7	53.8	-33.7	18.9	45.2
0.9	1.0	7.1	-1.3	2.2	6.0	-1.7	-1.6	-5.0	-11.1	-0.6	1.1	0.2	7.3	-4.6	2.6
4.1	16.8	4.0	29.6	-5.5	9.0	25.4	-7.0	-6.5	-21.2	-46.5	-2.5	4.6	1.0	30.5	-19.1
-3.4	11.3	-13.8	-3.3	-24.3	4.5	-7.4	-20.8	5.7	5.4	17.4	38.2	2.0	-3.8	-0.8	-25.0
5.8	33.5	-19.5	23.7	5.7	41.8	-7.7	12.8	35.8	-9.8	-9.2	-29.9	-65.7	-3.5	6.5	1.4
-9.8	96.1	-56.7	33.0	-40.2	-9.6	-70.8	13.1	-21.6	-60.7	16.6	15.6	50.6	111.1	5.9	-11.0
-6.9	47.0	67.2	-39.7	23.1	-28.1	-6.7	-49.5	9.1	-15.1	-42.4	11.6	10.9	35.4	77.7	4.1
1.5	2.3	-10.5	-15.0	8.8	-5.1	6.3	1.5	11.0	-2.0	3.4	9.5	-2.6	-2.4	-7.9	-17.3
-2.6	6.6	-3.9	17.6	25.2	-14.9	8.7	-10.5	-2.5	-18.6	3.4	-5.7	-15.9	4.4	4.1	13.3
-1.3	1.6	3.2	-1.9	8.6	12.3	-7.3	4.2	-5.1	-1.2	-9.1	1.7	-2.8	-7.8	2.1	2.0
11.2	125.8	-14.1	-28.8	17.1	-76.9	-109.9	64.9	-37.8	46.0	11.0	81.1	-14.9	24.7	69.4	-19.0
-8.7	74.8	-97.0	10.9	22.2	-13.2	59.3	84.8	-50.1	29.1	-35.5	-8.5	-62.5	11.5	-19.1	-53.6
12.5	155.8	-108.0	140.0	-15.7	-32.1	19.1	-85.6	-122.3	72.3	-42.0	51.2	12.2	90.2	-16.6	27.5
-8.5	72.5	-106.3	73.7	-95.5	10.7	21.9	-13.0	58.4	83.4	-49.3	28.7	-34.9	-8.3	-61.5	11.3

8.4	70.9	-71.7	105.1	-72.8	94.4	-10.6	-21.7	12.9	-57.7	-82.5	48.7	-28.3	34.5	8.2	60.8
1.0	1.1	8.7	-8.8	12.9	-8.9	11.6	-1.3	-2.7	1.6	-7.1	-10.1	6.0	-3.5	4.2	1.0
4.6	21.7	4.8	39.3	-39.7	58.2	-40.3	52.3	-5.9	-12.0	7.1	-32.0	-45.7	27.0	-15.7	19.1
-10.5	108.7	-48.6	-10.8	-87.8	88.8	-130.2	90.2	-117.0	13.1	26.8	-15.9	71.5	102.2	-60.4	35.1
-15.0	225.1	156.4	-70.0	-15.5	-126.3	127.7	-187.3	129.8	-168.3	18.8	38.6	-22.9	102.8	147.0	-86.9
-6.6	42.8	98.2	68.2	-30.5	-6.8	-55.1	55.7	-81.7	56.6	-73.4	8.2	16.8	-10.0	44.9	64.1
0.9	0.9	-6.3	-14.3	-10.0	4.5	1.0	8.0	-8.1	11.9	-8.3	10.7	-1.2	-2.5	1.5	-6.5
-0.9	0.7	-0.8	5.5	12.7	8.8	-4.0	-0.9	-7.1	7.2	-10.6	7.3	-9.5	1.1	2.2	-1.3
7.4	55.5	-6.3	7.1	-48.8	-111.8	-77.7	34.7	7.7	62.7	-63.4	93.0	-64.5	83.6	-9.3	-19.2
1.9	3.8	14.4	-1.6	1.9	-12.7	-29.1	-20.2	9.0	2.0	16.3	-16.5	24.2	-16.8	21.7	-2.4
7.6	57.8	14.7	56.7	-6.5	7.3	-49.8	-114.1	-79.3	35.5	7.9	64.0	-64.8	94.9	-65.8	85.3
-2.2	4.5	-16.2	-4.1	-15.9	1.8	-2.0	14.0	32.0	22.2	-9.9	-2.2	-18.0	18.2	-26.6	18.5
-1.4	1.9	2.9	-10.4	-2.6	-10.2	1.2	-1.3	8.9	20.4	14.2	-6.4	-1.4	-11.5	11.6	-17.0
-2.9	8.2	3.9	6.1	-21.8	-5.6	-21.4	2.4	-2.7	18.8	43.0	29.9	-13.4	-3.0	-24.1	24.4
11.1	124.7	-32.0	-15.2	-23.8	84.9	21.6	83.2	-9.5	10.7	-73.1	-167.6	-116.5	52.1	11.5	94.0
-8.0	63.5	-89.0	22.9	10.9	17.0	-60.6	-15.4	-59.4	6.8	-7.6	52.2	119.6	83.1	-37.2	-8.2
-6.7	44.7	53.3	-74.7	19.2	9.1	14.3	-50.9	-13.0	-49.8	5.7	-6.4	43.8	100.3	69.7	-31.2
0.4	0.2	-2.7	-3.2	4.5	-1.1	-0.5	-0.9	3.0	0.8	3.0	-0.3	0.4	-2.6	-6.0	-4.2
2.0	4.0	0.8	-13.4	-16.0	22.5	-5.8	-2.7	-4.3	15.3	3.9	15.0	-1.7	1.9	-13.2	-30.2
3.7	14.2	7.6	1.5	-25.2	-30.1	42.1	-10.8	-5.1	-8.0	28.7	7.3	28.1	-3.2	3.6	-24.7
-4.0	15.9	-15.0	-8.0	-1.6	26.7	31.8	-44.6	11.4	5.4	8.5	-30.3	-7.7	-29.7	3.4	-3.8
6.6	44.4	-26.6	25.1	13.4	2.7	-44.6	-53.1	74.5	-19.1	-9.1	-14.2	50.7	12.9	49.7	-5.7
-1.8	3.1	-11.8	7.1	-6.7	-3.6	-0.7	11.9	14.1	-19.8	5.1	2.4	3.8	-13.5	-3.4	-13.2
-3.6	12.9	6.4	-24.0	14.3	-13.5	-7.2	-1.4	24.0	28.6	-40.1	10.3	4.9	7.7	-27.3	-7.0

2.1	4.5	-7.6	-3.8	14.2	-8.5	8.0	4.3	0.9	-14.2	-17.0	23.8	-6.1	-2.9	-4.5	16.2
-3.2	10.0	-6.7	11.3	5.6	-21.1	12.6	-11.9	-6.4	-1.3	21.1	25.2	-35.3	9.1	4.3	6.7
5.4	29.9	-17.3	11.6	-19.7	-9.7	36.5	-21.8	20.6	11.0	2.2	-36.6	-43.6	61.1	-15.7	-7.5
-4.1	16.3	-22.1	12.8	-8.6	14.5	7.2	-26.9	16.1	-15.2	-8.1	-1.6	27.0	32.2	-45.1	11.6
-5.7	32.2	22.9	-31.0	17.9	-12.1	20.4	10.1	-37.8	22.6	-21.4	-11.4	-2.3	37.9	45.2	-63.4
1.7	3.0	-9.9	-7.1	9.5	-5.5	3.7	-6.3	-3.1	11.6	-7.0	6.6	3.5	0.7	-11.7	-13.9
-1.0	1.0	-1.7	5.6	4.0	-5.4	3.1	-2.1	3.5	1.7	-6.5	3.9	-3.7	-2.0	-0.4	6.6
2.6	6.9	-2.6	4.6	-14.9	-10.6	14.4	-8.3	5.6	-9.4	-4.7	17.5	-10.5	9.9	5.3	1.1
11.9	141.2	31.2	-11.7	20.7	-67.4	-48.0	65.0	-37.5	25.3	-42.7	-21.1	79.2	-47.4	44.8	23.9
4.8	23.1	57.1	12.6	-4.7	8.4	-27.3	-19.4	26.3	-15.2	10.2	-17.3	-8.5	32.1	-19.2	18.1
-9.3	85.7	-44.5	-110.0	-24.3	9.1	-16.2	52.5	37.4	-50.6	29.2	-19.7	33.3	16.4	-61.7	36.9
0.7	0.5	-6.5	3.4	8.3	1.8	-0.7	1.2	-4.0	-2.8	3.8	-2.2	1.5	-2.5	-1.2	4.7
2.0	3.9	1.4	-18.4	9.5	23.6	5.2	-1.9	3.5	-11.3	-8.0	10.9	-6.3	4.2	-7.1	-3.5
-1.7	2.8	-3.3	-1.2	15.6	-8.1	-20.0	-4.4	1.7	-2.9	9.5	6.8	-9.2	5.3	-3.6	6.0
4.2	17.5	-7.0	8.3	2.9	-38.7	20.1	49.7	11.0	-4.1	7.3	-23.7	-16.9	22.9	-13.2	8.9
-7.5	56.0	-31.3	12.6	-14.9	-5.3	69.3	-36.0	-88.9	-19.7	7.3	-13.1	42.5	30.2	-40.9	23.6
-8.3	68.3	61.9	-34.5	13.9	-16.4	-5.8	76.5	-39.7	-98.2	-21.7	8.1	-14.4	46.9	33.4	-45.2
2.9	8.5	-24.0	-21.8	12.2	-4.9	5.8	2.0	-26.9	14.0	34.6	7.6	-2.9	5.1	-16.5	-11.8
3.9	15.3	11.4	-32.3	-29.3	16.3	-6.6	7.8	2.7	-36.2	18.8	46.5	10.3	-3.8	6.8	-22.2
-4.0	15.7	-15.5	-11.5	32.7	29.6	-16.5	6.7	-7.9	-2.8	36.6	-19.0	-47.0	-10.4	3.9	-6.9
-2.8	7.5	10.9	-10.7	-8.0	22.7	20.6	-11.5	4.6	-5.5	-1.9	25.4	-13.2	-32.6	-7.2	2.7
7.7	59.3	-21.2	-30.5	30.1	22.4	-63.6	-57.6	32.2	-12.9	15.3	5.4	-71.3	37.0	91.5	20.2
0.3	0.1	2.5	-0.9	-1.3	1.3	1.0	-2.7	-2.5	1.4	-0.6	0.7	0.2	-3.0	1.6	3.9
0.8	0.7	0.3	6.6	-2.3	-3.4	3.3	2.5	-7.0	-6.4	3.6	-1.4	1.7	0.6	-7.9	4.1

-2.5	6.2	-2.1	-0.8	-19.2	6.9	9.9	-9.8	-7.3	20.7	18.7	-10.5	4.2	-5.0	-1.8	23.1
0.1	0.0	-0.3	0.1	0.0	1.0	-0.4	-0.5	0.5	0.4	-1.1	-1.0	0.6	-0.2	0.3	0.1
6.6	43.3	0.9	-16.5	5.6	2.2	50.7	-18.1	-26.0	25.7	19.1	-54.4	-49.3	27.5	-11.1	13.1
-4.7	22.2	-31.0	-0.6	11.8	-4.0	-1.5	-36.3	13.0	18.7	-18.4	-13.7	38.9	35.3	-19.7	7.9
-5.8	33.4	27.3	-38.1	-0.8	14.5	-4.9	-1.9	-44.5	15.9	22.9	-22.6	-16.8	47.8	43.3	-24.2
2.7	7.7	-16.0	-13.1	18.2	0.4	-6.9	2.4	0.9	21.3	-7.6	-11.0	10.8	8.1	-22.9	-20.7
1.6	2.8	4.6	-9.6	-7.9	11.0	0.2	-4.2	1.4	0.5	12.8	-4.6	-6.6	6.5	4.9	-13.8
-4.5	19.9	-7.4	-12.4	25.8	21.0	-29.4	-0.6	11.2	-3.8	-1.5	-34.4	12.3	17.7	-17.5	-13.0
11.4	131.1	-51.1	19.1	31.7	-66.2	-54.0	75.3	1.5	-28.6	9.7	3.8	88.1	-31.5	-45.3	44.8
-2.6	6.6	-29.3	11.4	-4.3	-7.1	14.8	12.1	-16.8	-0.3	6.4	-2.2	-0.8	-19.7	7.0	10.1
-5.5	30.0	14.0	-62.7	24.5	-9.1	-15.2	31.7	25.8	-36.1	-0.7	13.7	-4.7	-1.8	-42.2	15.1
0.1	0.0	-0.8	-0.4	1.7	-0.6	0.2	0.4	-0.8	-0.7	1.0	0.0	-0.4	0.1	0.0	1.1
0.7	0.6	0.1	-4.1	-1.9	8.5	-3.3	1.2	2.1	-4.3	-3.5	4.9	0.1	-1.9	0.6	0.2
0.2	0.1	0.2	0.0	-1.4	-0.6	2.9	-1.1	0.4	0.7	-1.4	-1.2	1.6	0.0	-0.6	0.2
2.8	7.8	0.7	2.1	0.4	-15.4	-7.2	32.1	-12.5	4.7	7.8	-16.2	-13.2	18.4	0.4	-7.0
-4.9	24.1	-13.8	-1.2	-3.7	-0.7	26.9	12.6	-56.3	21.9	-8.2	-13.6	28.4	23.2	-32.3	-0.7
-4.8	23.1	23.6	-13.5	-1.2	-3.6	-0.7	26.4	12.3	-55.1	21.5	-8.0	-13.3	27.8	22.7	-31.7
2.9	8.4	-14.0	-14.3	8.1	0.7	2.2	0.4	-15.9	-7.4	33.3	-13.0	4.8	8.1	-16.8	-13.7
0.9	0.9	2.7	-4.5	-4.6	2.6	0.2	0.7	0.1	-5.1	-2.4	10.8	-4.2	1.6	2.6	-5.4
-6.8	45.5	-6.3	-19.6	32.4	33.1	-18.9	-1.7	-5.0	-1.0	37.0	17.3	-77.2	30.1	-11.2	-18.7
14.7	218.3	-99.7	13.9	42.9	-71.1	-72.6	41.4	3.7	11.0	2.1	-81.0	-37.8	169.2	-66.0	24.6
-3.6	12.7	-52.6	24.0	-3.3	-10.3	17.1	17.5	-10.0	-0.9	-2.7	-0.5	19.5	9.1	-40.7	15.9
-2.3	5.1	8.1	-33.5	15.3	-2.1	-6.6	10.9	11.1	-6.3	-0.6	-1.7	-0.3	12.4	5.8	-25.9
-2.1	4.2	4.7	7.3	-30.3	13.9	-1.9	-6.0	9.9	10.1	-5.8	-0.5	-1.5	-0.3	11.3	5.3

1.9	3.8	-4.0	-4.4	-6.9	28.8	-13.1	1.8	5.7	-9.4	-9.6	5.5	0.5	1.5	0.3	-10.7
-0.1	0.0	-0.2	0.2	0.2	0.3	-1.1	0.5	-0.1	-0.2	0.4	0.4	-0.2	0.0	-0.1	0.0
6.3	39.5	-0.5	12.3	-12.9	-14.2	-22.4	92.9	-42.4	5.9	18.3	-30.2	-30.9	17.6	1.6	4.7
-6.3	39.1	-39.3	0.5	-12.2	12.8	14.2	22.3	-92.4	42.2	-5.9	-18.2	30.1	30.7	-17.5	-1.6
-7.2	51.5	44.9	-45.1	0.6	-14.0	14.7	16.3	25.5	-106.1	48.4	-6.7	-20.9	34.5	35.3	-20.1
-6.5	41.7	46.4	40.4	-40.6	0.5	-12.6	13.3	14.6	23.0	-95.4	43.6	-6.1	-18.8	31.1	31.7
-26.7	709.9	172.1	191.3	166.7	-167.5	2.1	-51.9	54.7	60.4	94.8	-393.7	179.7	-25.0	-77.4	128.2
-20.8	430.0	552.5	133.9	148.9	129.7	-130.4	1.6	-40.4	42.6	47.0	73.8	-306.4	139.9	-19.5	-60.2
-5.5	29.7	113.0	145.2	35.2	39.1	34.1	-34.2	0.4	-10.6	11.2	12.3	19.4	-80.5	36.7	-5.1
0.6	0.4	-3.2	-12.3	-15.8	-3.8	-4.3	-3.7	3.7	0.0	1.2	-1.2	-1.3	-2.1	8.7	-4.0
1.0	1.0	0.6	-5.3	-20.3	-26.1	-6.3	-7.0	-6.1	6.2	-0.1	1.9	-2.0	-2.2	-3.5	14.5
-8.5	72.2	-8.3	-5.0	46.3	176.2	226.4	54.9	61.0	53.2	-53.4	0.7	-16.6	17.5	19.2	30.2
2.0	4.3	-17.5	2.0	1.2	-11.2	-42.8	-55.0	-13.3	-14.8	-12.9	13.0	-0.2	4.0	-4.2	-4.7
9.4	88.2	19.4	-79.8	9.2	5.6	-51.2	-194.7	-250.2	-60.7	-67.4	-58.8	59.0	-0.7	18.3	-19.3
1.2	1.6	11.8	2.6	-10.7	1.2	0.7	-6.9	-26.1	-33.5	-8.1	-9.0	-7.9	7.9	-0.1	2.5
-7.5	55.2	-9.4	-69.8	-15.3	63.2	-7.3	-4.4	40.5	154.1	198.0	48.0	53.4	46.5	-46.7	0.6
-5.2	26.7	38.4	-6.5	-48.5	-10.7	43.9	-5.1	-3.1	28.1	107.1	137.6	33.3	37.1	32.3	-32.5
4.6	21.3	-23.8	-34.3	5.8	43.3	9.5	-39.2	4.5	2.7	-25.1	-95.6	-122.8	-29.8	-33.1	-28.8
2.6	6.8	12.1	-13.5	-19.4	3.3	24.6	5.4	-22.2	2.6	1.5	-14.2	-54.2	-69.7	-16.9	-18.8
0.4	0.1	1.0	1.8	-2.0	-2.8	0.5	3.6	0.8	-3.3	0.4	0.2	-2.1	-7.9	-10.2	-2.5
6.3	40.1	2.4	16.6	29.2	-32.7	-47.0	8.0	59.4	13.1	-53.8	6.2	3.7	-34.5	-131.3	-168.7
-19.1	362.0	-120.4	-7.3	-49.8	-87.7	98.2	141.4	-23.9	-178.7	-39.3	161.7	-18.7	-11.3	103.7	394.6
-1.5	2.0	27.1	-9.0	-0.5	-3.7	-6.6	7.4	10.6	-1.8	-13.4	-2.9	12.1	-1.4	-0.8	7.8
9.2	85.2	-13.2	-175.6	58.4	3.5	24.1	42.5	-47.6	-68.6	11.6	86.7	19.0	-78.4	9.0	5.5

9.6	93.3	89.1	-13.8	-183.8	61.1	3.7	25.3	44.5	-49.9	-71.8	12.2	90.7	19.9	-82.1	9.5
1.1	1.3	10.8	10.3	-1.6	-21.3	7.1	0.4	2.9	5.2	-5.8	-8.3	1.4	10.5	2.3	-9.5
5.4	29.3	6.1	52.3	49.9	-7.7	-103.0	34.3	2.1	14.2	24.9	-27.9	-40.2	6.8	50.8	11.2
2.1	4.3	11.3	2.3	20.1	19.2	-3.0	-39.7	13.2	0.8	5.5	9.6	-10.8	-15.5	2.6	19.6
-2.4	5.8	-5.0	-13.0	-2.7	-23.2	-22.2	3.4	45.7	-15.2	-0.9	-6.3	-11.1	12.4	17.9	-3.0
8.6	73.9	-20.6	17.9	46.5	9.6	83.0	79.3	-12.2	-163.5	54.4	3.3	22.5	39.6	-44.4	-63.9
0.4	0.2	3.6	-1.0	0.9	2.3	0.5	4.1	3.9	-0.6	-8.0	2.7	0.2	1.1	1.9	-2.2
14.6	214.8	6.1	125.9	-35.2	30.6	79.3	16.4	141.6	135.2	-20.9	-278.8	92.8	5.6	38.3	67.6
-1.1	1.1	-15.4	-0.4	-9.0	2.5	-2.2	-5.7	-1.2	-10.2	-9.7	1.5	20.0	-6.7	-0.4	-2.7
1.9	3.7	-2.0	28.1	0.8	16.5	-4.6	4.0	10.4	2.2	18.5	17.7	-2.7	-36.5	12.2	0.7
0.1	0.0	0.2	-0.1	1.7	0.0	1.0	-0.3	0.2	0.6	0.1	1.1	1.1	-0.2	-2.2	0.7
0.7	0.5	0.1	1.4	-0.8	10.8	0.3	6.3	-1.8	1.5	4.0	0.8	7.1	6.8	-1.0	-14.0
3.7	13.9	2.7	0.4	7.2	-3.9	54.7	1.6	32.1	-9.0	7.8	20.2	4.2	36.0	34.4	-5.3
-2.3	5.3	-8.6	-1.7	-0.3	-4.4	2.4	-33.7	-1.0	-19.8	5.5	-4.8	-12.5	-2.6	-22.2	-21.2
7.1	51.4	-16.5	26.7	5.3	0.8	13.8	-7.5	105.0	3.0	61.6	-17.2	14.9	38.8	8.0	69.2
-3.7	13.5	-26.3	8.4	-13.7	-2.7	-0.4	-7.0	3.9	-53.7	-1.5	-31.5	8.8	-7.6	-19.8	-4.1
-4.2	17.3	15.3	-29.8	9.6	-15.5	-3.1	-0.5	-8.0	4.4	-61.0	-1.7	-35.8	10.0	-8.7	-22.5
1.4	2.2	-6.1	-5.4	10.5	-3.4	5.5	1.1	0.2	2.8	-1.5	21.5	0.6	12.6	-3.5	3.1
8.4	71.4	12.4	-35.2	-31.0	60.6	-19.4	31.5	6.2	1.0	16.2	-8.9	123.8	3.5	72.6	-20.3
2.4	5.7	20.2	3.5	-9.9	-8.8	17.1	-5.5	8.9	1.8	0.3	4.6	-2.5	35.0	1.0	20.5
-2.4	5.4	-5.6	-19.7	-3.4	9.7	8.6	-16.7	5.4	-8.7	-1.7	-0.3	-4.5	2.5	-34.2	-1.0
1.1	1.3	-2.7	2.8	9.8	1.7	-4.8	-4.2	8.3	-2.7	4.3	0.8	0.1	2.2	-1.2	16.9
-3.2	10.1	-3.7	7.4	-7.6	-26.9	-4.7	13.2	11.7	-22.8	7.3	-11.9	-2.3	-0.4	-6.1	3.3
0.9	0.9	-3.0	1.1	-2.2	2.3	8.0	1.4	-4.0	-3.5	6.8	-2.2	3.6	0.7	0.1	1.8

1.5	2.3	1.4	-4.8	1.7	-3.5	3.6	12.7	2.2	-6.2	-5.5	10.8	-3.5	5.6	1.1	0.2
-3.4	11.3	-5.0	-3.2	10.7	-3.9	7.8	-8.0	-28.4	-4.9	14.0	12.3	-24.1	7.7	-12.5	-2.5
10.8	117.8	-36.4	16.3	10.3	-34.5	12.5	-25.3	25.9	91.7	15.9	-45.2	-39.8	77.8	-25.0	40.5

<i>lag</i>	<i>Denominator</i>	<i>Numerator</i>	<i>ACF</i>
1	7459.363128	7459.36	1
2	7459.363128	47.94554497	0.006428
3	7459.363128	-13.8281044	-0.00185
4	7459.363128	33.70172599	0.004518
5	7459.363128	-43.1846384	-0.00579
6	7459.363128	-108.566977	-0.01455
7	7459.363128	-173.464956	-0.02325
8	7459.363128	-576.624885	-0.0773
9	7459.363128	-342.449652	-0.04591
10	7459.363128	168.8473227	0.022636
11	7459.363128	-466.793425	-0.06258
12	7459.363128	-280.300363	-0.03758
13	7459.363128	2453.808685	0.328957
14	7459.363128	-238.638597	-0.03199
15	7459.363128	618.7922444	0.082955



PACF (2)	PACF (3)	PACF (4)	PACF (5)	PACF (6)	PACF (7)	PACF (8)	PACF (9)	PACF (10)	PACF (11)	PACF (12)	PACF (13)	PACF (14)	PACF (15)
0.0064	0.0064	0.0064	0.0065	0.0064	0.0061	0.0043	0.0008	0.0018	0.0032	0.0008	0.0136	0.0292	0.0331
	-0.0019	-0.0019	-0.0019	-0.0019	-0.0020	-0.0031	-0.0041	-0.0024	-0.0053	-0.0044	0.0165	0.0146	-0.0127
		0.0045	0.0046	0.0046	0.0047	0.0042	0.0036	0.0041	-0.0008	-0.0026	-0.0100	-0.0130	-0.0098
			-0.0059	-0.0058	-0.0058	-0.0054	-0.0057	-0.0054	-0.0068	-0.0098	0.0053	0.0064	0.0115
				-0.0145	-0.0143	-0.0145	-0.0143	-0.0141	-0.0150	-0.0159	0.0094	0.0074	0.0054
					-0.0231	-0.0227	-0.0228	-0.0229	-0.0232	-0.0238	-0.0159	-0.0193	-0.0159
						-0.0771	-0.0769	-0.0768	-0.0765	-0.0768	-0.0715	-0.0723	-0.0663
							-0.0454	-0.0454	-0.0456	-0.0456	-0.0424	-0.0419	-0.0403
								0.0227	0.0228	0.0226	0.0235	0.0237	0.0231
									-0.0634	-0.0632	-0.0618	-0.0623	-0.0628
										-0.0388	-0.0391	-0.0383	-0.0372
											0.3301	0.3307	0.3295
												-0.0472	-0.0496
													0.0827

Tabel Matrix Ordo 15 x 15

1.00	0.01	0.00	0.00	-0.01	-0.01	-0.02	-0.08	-0.05	0.02	-0.06	-0.04	0.33	-0.03	0.08
0.01	1.00	0.01	0.00	0.00	-0.01	-0.01	-0.02	-0.08	-0.05	0.02	-0.06	-0.04	0.33	-0.03
0.00	0.01	1.00	0.01	0.00	0.00	-0.01	-0.01	-0.02	-0.08	-0.05	0.02	-0.06	-0.04	0.33
0.00	0.00	0.01	1.00	0.01	0.00	0.00	-0.01	-0.01	-0.02	-0.08	-0.05	0.02	-0.06	-0.04

-0.01	0.00	0.00	0.01	1.00	0.01	0.00	0.00	-0.01	-0.01	-0.02	-0.08	-0.05	0.02	-0.06
-0.01	-0.01	0.00	0.00	0.01	1.00	0.01	0.00	0.00	-0.01	-0.01	-0.02	-0.08	-0.05	0.02
-0.02	-0.01	-0.01	0.00	0.00	0.01	1.00	0.01	0.00	0.00	-0.01	-0.01	-0.02	-0.08	-0.05
-0.08	-0.02	-0.01	-0.01	0.00	0.00	0.01	1.00	0.01	0.00	0.00	-0.01	-0.01	-0.02	-0.08
-0.05	-0.08	-0.02	-0.01	-0.01	0.00	0.00	0.01	1.00	0.01	0.00	0.00	-0.01	-0.01	-0.02
0.02	-0.05	-0.08	-0.02	-0.01	-0.01	0.00	0.00	0.01	1.00	0.01	0.00	0.00	-0.01	-0.01
-0.06	0.02	-0.05	-0.08	-0.02	-0.01	-0.01	0.00	0.00	0.01	1.00	0.01	0.00	0.00	-0.01
-0.04	-0.06	0.02	-0.05	-0.08	-0.02	-0.01	-0.01	0.00	0.00	0.01	1.00	0.01	0.00	0.00
0.33	-0.04	-0.06	0.02	-0.05	-0.08	-0.02	-0.01	-0.01	0.00	0.00	0.01	1.00	0.01	0.00
-0.03	0.33	-0.04	-0.06	0.02	-0.05	-0.08	-0.02	-0.01	-0.01	0.00	0.00	0.01	1.00	0.01
0.08	-0.03	0.33	-0.04	-0.06	0.02	-0.05	-0.08	-0.02	-0.01	-0.01	0.00	0.00	0.01	1.00

ACF	X-Squared	h	p-value
1			
0.006427565	0.009998411	1	0.9204*
-0.001853792	0.000831687	2	0.9995842
0.004518043	0.004940135	3	0.9999078
-0.00578932	0.008111349	4	0.9999918

b. Dengan Bantuan R-Studio 4.4.2

Box-Ljung test

data: sisaan.da
X-squared = 0.0099984, df = 1, p-value = 0.9204

Kesimpulan:

Berdasarkan hasil Uji *Ljung-Box* terhadap residual model ARIMA(2,1,4), diperoleh nilai statistik *Chi-kuadrat* (X^2) sebesar 0.009998 dengan *p-value* sebesar 0.9204.

Karena *p-value* > 0.05 , maka keputusan uji adalah gagal menolak H_0 . Dengan demikian, dapat disimpulkan bahwa residual model tidak mengandung autokorelasi yang signifikan dan telah memenuhi asumsi *white noise*.



Lampiran 56 Hasil Uji Normalitas Residual Model ARIMA(2,1,4)

a. Dengan Bantuan Microsoft Excel 2016

No	Residual	Z	F(Z)	S(Z)	F(Z)-S(Z)	X-Rata
1	-26.67	-4.759270209	9.71471E-07	0.00418	0.00418313	709.9136355
2	-20.77	-3.704065905	0.000106086	0.00837	0.00826212	430.0136117
3	-19.06	-3.398751265	0.000338471	0.01255	0.01221383	362.0458361
4	-15.03	-2.679817925	0.003683111	0.01674	0.01305329	225.0792027
5	-11.37	-2.025489025	0.021408587	0.02092	0.00048809	128.583304
6	-10.46	-1.862604859	0.03125894	0.02510	0.00615434	108.7342231
7	-9.83	-1.750604504	0.040007029	0.02929	0.01071833	96.05077548
8	-9.29	-1.653933787	0.049070483	0.03347	0.01559768	85.73556828
9	-8.68	-1.545370155	0.061128378	0.03766	0.02347147	74.8496603
10	-8.54	-1.520869768	0.064146261	0.04184	0.02230526	72.49513227
11	-8.53	-1.517985941	0.064508971	0.04603	0.01848387	72.22046676
12	-8.29	-1.475863079	0.069990326	0.05021	0.01978112	68.26796063
13	-8.10	-1.441618801	0.074704971	0.05439	0.02031167	65.13668729
14	-8.00	-1.423792686	0.077253247	0.05858	0.01867584	63.53577147
15	-7.52	-1.337126118	0.090590737	0.06276	0.02782923	56.03631094
16	-7.46	-1.327676339	0.092142527	0.06695	0.02519692	55.24706661
17	-7.21	-1.282401572	0.099850907	0.07113	0.0287212	51.54337778
18	-6.88	-1.224448628	0.110391517	0.07531	0.03507771	46.99005254
19	-6.77	-1.20479174	0.114141855	0.07950	0.03464395	45.4934377
20	-6.72	-1.194402179	0.116160342	0.08368	0.03247833	44.71219252
21	-6.57	-1.168769308	0.121248295	0.08787	0.03338219	42.81366332
22	-6.49	-1.153640646	0.124323764	0.09205	0.03227355	41.7124684
23	-6.29	-1.117574099	0.131874468	0.09623	0.03564016	39.14510376
24	-5.91	-1.050417905	0.146763009	0.10042	0.0463446	34.58191381
25	-5.81	-1.032834048	0.150840784	0.10460	0.04623827	33.43381115
26	-5.76	-1.023279228	0.153087921	0.10879	0.04430131	32.81807546
27	-5.70	-1.013330993	0.155451044	0.11297	0.04248033	32.18306809
28	-5.57	-0.989496691	0.161210094	0.11715	0.04405528	30.68693299
29	-5.51	-0.978975343	0.163796081	0.12134	0.04245717	30.03781234
30	-5.48	-0.973182704	0.165231253	0.12552	0.03970824	29.68339392
31	-5.40	-0.958509533	0.168902943	0.12971	0.03919583	28.79503864
32	-5.34	-0.949105722	0.171283422	0.13389	0.03739221	28.23280155
33	-5.24	-0.93140127	0.175823017	0.13808	0.0377477	27.18932613
34	-5.24	-0.930460256	0.176066416	0.14226	0.033807	27.134414
35	-5.19	-0.922214288	0.178208406	0.14644	0.03176489	26.65560138
36	-5.19	-0.922180655	0.178217176	0.15063	0.02758956	26.65365718

37	-5.08	-0.902398863	0.183422512	0.15481	0.0286108	25.52242118
38	-4.97	-0.883191667	0.188566362	0.15900	0.02957055	24.44751481
39	-4.94	-0.877792336	0.190028212	0.16318	0.0268483	24.14951217
40	-4.84	-0.85928459	0.195091762	0.16736	0.02772775	23.14189075
41	-4.74	-0.841873185	0.199929471	0.17155	0.02838135	22.21355903
42	-4.70	-0.833516147	0.202276848	0.17573	0.02654463	21.77473242
43	-4.58	-0.812121351	0.208361001	0.17992	0.02844468	20.67124573
44	-4.56	-0.809332581	0.209161935	0.18410	0.02506152	20.52952215
45	-4.49	-0.797422198	0.212602936	0.18828	0.02431842	19.92973091
46	-4.41	-0.781851886	0.217150812	0.19247	0.02468219	19.1590411
47	-4.30	-0.762926846	0.222753512	0.19665	0.02610079	18.24276177
48	-4.19	-0.743722628	0.228522149	0.20084	0.02768533	17.33591554
49	-4.16	-0.737326342	0.230461958	0.20502	0.02544104	17.03900745
50	-4.07	-0.721796514	0.235209797	0.20921	0.02600478	16.32880311
51	-4.02	-0.71264331	0.238033252	0.21339	0.02464413	15.91729326
52	-3.99	-0.706932415	0.239804239	0.21757	0.02223102	15.66320329
53	-3.88	-0.688392963	0.245602677	0.22176	0.02384535	14.85243421
54	-3.70	-0.655124887	0.256193675	0.22594	0.03025225	13.45157037
55	-3.64	-0.645406881	0.259331773	0.23013	0.02920625	13.05545388
56	-3.62	-0.641719217	0.260527755	0.23431	0.02621813	12.9066901
57	-3.59	-0.635477646	0.262558471	0.23849	0.02406475	12.6568417
58	-3.40	-0.601218937	0.273847087	0.24268	0.03116926	11.32896136
59	-3.39	-0.599649458	0.274369939	0.24686	0.02750801	11.26989018
60	-3.33	-0.5893493	0.27781349	0.25105	0.02676746	10.88605029
61	-3.21	-0.567902332	0.285050644	0.25523	0.02982052	10.10815976
62	-3.19	-0.564195818	0.286310437	0.25941	0.02689621	9.976644977
63	-3.00	-0.53042738	0.297907823	0.26360	0.0343095	8.8181333
64	-2.97	-0.525286978	0.299691854	0.26778	0.03190943	8.648047399
65	-2.90	-0.512176386	0.304263784	0.27197	0.03229726	8.221742973
66	-2.82	-0.498408167	0.309098191	0.27615	0.03294756	7.785653885
67	-2.78	-0.490803347	0.311782771	0.28033	0.03144804	7.549876091
68	-2.60	-0.459367704	0.322985068	0.28452	0.03846624	6.613718556
69	-2.59	-0.457154683	0.323779934	0.28870	0.03507701	6.550148387
70	-2.53	-0.446493215	0.327620506	0.29289	0.03473348	6.248194211
71	-2.49	-0.44004811	0.329951131	0.29707	0.03288	6.069111452
72	-2.43	-0.429133104	0.333913181	0.30126	0.03265795	5.771767497
73	-2.36	-0.416673218	0.338458723	0.30544	0.03301939	5.441466589
74	-2.33	-0.411583814	0.340322248	0.30962	0.03069882	5.309350152
75	-2.33	-0.411064569	0.340512595	0.31381	0.02670506	5.295962281
76	-2.29	-0.404594417	0.342887831	0.31799	0.0248962	5.130557562

77	-2.28	-0.401293557	0.344102003	0.32218	0.02192627	5.047184336
78	-2.16	-0.380978902	0.351609452	0.32636	0.02524962	4.549112153
79	-2.08	-0.366791842	0.356887147	0.33054	0.02634321	4.216616733
80	-2.08	-0.365627971	0.35732135	0.33473	0.02259332	4.189899602
81	-2.05	-0.36131996	0.358930137	0.33891	0.020018	4.091746315
82	-2.01	-0.35399496	0.36167133	0.34310	0.0185751	3.927524922
83	-1.80	-0.316794338	0.37569983	0.34728	0.0284195	3.145427035
84	-1.75	-0.307859598	0.379094585	0.35146	0.02763015	2.970504321
85	-1.73	-0.303340565	0.380815168	0.35565	0.02516663	2.883937043
86	-1.71	-0.30046014	0.381913098	0.35983	0.02208046	2.829427186
87	-1.65	-0.29004287	0.385891721	0.36402	0.02187498	2.636629942
88	-1.62	-0.284612096	0.387970672	0.36820	0.01976983	2.538817588
89	-1.62	-0.284532982	0.388000981	0.37238	0.01561604	2.537406364
90	-1.47	-0.257252694	0.398491854	0.37657	0.02192282	2.07417146
91	-1.46	-0.254587552	0.399520837	0.38075	0.0187677	2.031417187
92	-1.39	-0.243366143	0.403860885	0.38494	0.01892365	1.856286949
93	-1.36	-0.238001722	0.405939879	0.38912	0.01681854	1.775354116
94	-1.28	-0.224121204	0.411331497	0.39331	0.01802606	1.574311563
95	-1.26	-0.220301861	0.412818036	0.39749	0.0153285	1.521111754
96	-1.08	-0.187802617	0.425515692	0.40167	0.02384205	1.105421916
97	-1.01	-0.175328682	0.430410688	0.40586	0.02455295	0.963453434
98	-0.95	-0.1643202	0.43473954	0.41004	0.0246977	0.84626563
99	-0.93	-0.1612479	0.435949078	0.41423	0.02172314	0.81491615
100	-0.88	-0.151488529	0.439795179	0.41841	0.02138514	0.71925732
101	-0.86	-0.14828367	0.441059451	0.42259	0.01846531	0.689146328
102	-0.77	-0.132440528	0.44731793	0.42678	0.02053969	0.549751725
103	-0.67	-0.11467614	0.454350913	0.43096	0.02338857	0.412164826
104	-0.63	-0.107232009	0.457302461	0.43515	0.02215602	0.360390787
105	-0.55	-0.093568763	0.462725862	0.43933	0.02339532	0.274401557
106	-0.51	-0.08610505	0.465691454	0.44351	0.02217681	0.232371062
107	-0.41	-0.06817046	0.472824971	0.44770	0.02512623	0.145652266
108	-0.39	-0.064153109	0.474424157	0.45188	0.02254131	0.128991237
109	-0.36	-0.059324071	0.476346994	0.45607	0.02028005	0.110302839
110	-0.30	-0.048660269	0.48059502	0.46025	0.02034397	0.074211942
111	-0.17	-0.025322365	0.489898917	0.46444	0.02546377	0.020097097
112	-0.17	-0.024395741	0.490268473	0.46862	0.02164923	0.018653178
113	-0.11	-0.013850351	0.494474686	0.47280	0.02167134	0.006012379
114	-0.07	-0.007425198	0.497037802	0.47699	0.02005035	0.001727989
115	0.00	0.004636916	0.501849855	0.48117	0.02067831	0.000673881
116	0.08	0.020438204	0.508153096	0.48536	0.02279745	0.013092128

117	0.09	0.020885075	0.508331334	0.48954	0.01879159	0.013670893
118	0.09	0.021739138	0.508671978	0.49372	0.01494813	0.014811854
119	0.11	0.024154981	0.509635506	0.49791	0.01172756	0.01828682
120	0.11	0.025870225	0.510319575	0.50209	0.00822753	0.020976122
121	0.21	0.042733297	0.517042932	0.50628	0.01076678	0.057234461
122	0.22	0.044719373	0.517834504	0.51046	0.00737425	0.062678156
123	0.23	0.04609218	0.518381611	0.51464	0.00373726	0.066585443
124	0.30	0.058719258	0.52341214	0.51883	0.00458369	0.108065211
125	0.35	0.068420396	0.527274507	0.52301	0.00426195	0.146722242
126	0.36	0.069857963	0.527846644	0.52720	0.00064999	0.152952515
127	0.37	0.071622656	0.528548895	0.53138	0.00283186	0.160777635
128	0.39	0.074946774	0.529871469	0.53556	0.00569338	0.176047829
129	0.44	0.084812686	0.533794846	0.53975	0.00595411	0.225448022
130	0.56	0.105757592	0.542112658	0.54393	0.0018204	0.350548328
131	0.67	0.125332073	0.549869669	0.54812	0.00175251	0.492321998
132	0.70	0.131236634	0.552205942	0.55230	9.5314E-05	0.539802582
133	0.72	0.133085332	0.552937052	0.55649	0.0035483	0.555117834
134	0.73	0.135768051	0.553997676	0.56067	0.00667178	0.5777234
135	0.74	0.136876682	0.554435865	0.56485	0.01041769	0.587196871
136	0.75	0.139440073	0.555448796	0.56904	0.01358886	0.609396553
137	0.79	0.146559139	0.558259996	0.57322	0.01496176	0.673210071
138	0.82	0.152018727	0.560413917	0.57741	0.01699194	0.72430082
139	0.91	0.167777032	0.566620654	0.58159	0.0149693	0.882246219
140	0.92	0.170113462	0.567539547	0.58577	0.01823451	0.906989286
141	0.93	0.170634328	0.567744348	0.58996	0.02221381	0.912551965
142	0.95	0.174483701	0.56925733	0.59414	0.02488493	0.954189253
143	0.95	0.175156586	0.569521702	0.59833	0.02880466	0.961562986
144	1.00	0.184362287	0.573135373	0.60251	0.02937509	1.065292733
145	1.07	0.197153642	0.578146346	0.60669	0.02854821	1.218244332
146	1.09	0.200245827	0.579355836	0.61088	0.03152283	1.256758239
147	1.09	0.200281591	0.579369821	0.61506	0.03569294	1.257207198
148	1.12	0.205469594	0.581397374	0.61925	0.03784949	1.323183018
149	1.13	0.206553806	0.58182083	0.62343	0.04161013	1.337184079
150	1.23	0.224792188	0.588929528	0.62762	0.03868553	1.58375217
151	1.44	0.262174957	0.60340672	0.63180	0.02839244	2.154305068
152	1.47	0.268046208	0.605668125	0.63598	0.03031514	2.251874211
153	1.50	0.272804103	0.607498097	0.64017	0.03266927	2.332526516
154	1.51	0.275762712	0.608634837	0.64435	0.03571663	2.383394185
155	1.64	0.297898349	0.617109626	0.64854	0.03142594	2.781384215
156	1.68	0.305383174	0.619962832	0.65272	0.03275683	2.922907034

157	1.69	0.30788496	0.620915065	0.65690	0.0359887	2.97099377
158	1.72	0.311858496	0.622425967	0.66109	0.0386619	3.048175396
159	1.72	0.31214171	0.622533585	0.66527	0.04273838	3.053714299
160	1.89	0.342927802	0.634173612	0.66946	0.03528245	3.685786581
161	1.91	0.346065723	0.635353339	0.67364	0.03828683	3.753547914
162	1.92	0.348149878	0.636136186	0.67782	0.04168808	3.798894965
163	1.96	0.354628626	0.638566086	0.68201	0.04344228	3.941598382
164	1.98	0.359233001	0.640289605	0.68619	0.04590286	4.044615536
165	2.03	0.36853329	0.643762186	0.69038	0.04661438	4.256750937
166	2.06	0.372454699	0.645222833	0.69456	0.04933784	4.347821534
167	2.10	0.38030691	0.648141197	0.69874	0.05060357	4.533078358
168	2.10	0.380539673	0.648227574	0.70293	0.0547013	4.538628894
169	2.17	0.393537116	0.653038592	0.70711	0.05407438	4.853959956
170	2.21	0.40009659	0.655457312	0.71130	0.05583976	5.017120046
171	2.36	0.426220384	0.665026367	0.71548	0.0504548	5.693682229
172	2.39	0.433128546	0.667539307	0.71967	0.05212596	5.879743855
173	2.57	0.464649183	0.678908647	0.72385	0.04494072	6.766672356
174	2.58	0.465511308	0.679217329	0.72803	0.04881614	6.791805839
175	2.59	0.467128875	0.679796162	0.73222	0.05242141	6.839088421
176	2.59	0.467715568	0.680005997	0.73640	0.05639568	6.856278412
177	2.60	0.469132143	0.680512408	0.74059	0.06007337	6.89787266
178	2.67	0.481857632	0.685046457	0.74477	0.05972342	7.277165916
179	2.74	0.495029327	0.68971029	0.74895	0.05924368	7.680449712
180	2.77	0.500444119	0.691618803	0.75314	0.06151927	7.849391154
181	2.78	0.502201722	0.692237184	0.75732	0.06508499	7.904623483
182	2.88	0.518939191	0.698098426	0.76151	0.06340785	8.440297071
183	2.88	0.519711298	0.698367594	0.76569	0.06732278	8.465431676
184	3.08	0.556218919	0.710969396	0.76987	0.05890508	9.69652911
185	3.39	0.611462498	0.729553281	0.77406	0.0445053	11.71829549
186	3.42	0.615883331	0.731014238	0.77824	0.04722844	11.88835302
187	3.47	0.625902073	0.734310413	0.78243	0.04811637	12.2782811
188	3.55	0.638945846	0.738570919	0.78661	0.04803996	12.79537136
189	3.70	0.666150214	0.747342454	0.79079	0.04345252	13.90814263
190	3.72	0.669662787	0.74846361	0.79498	0.04651547	14.05520305
191	3.74	0.673509889	0.74968852	0.79916	0.04947466	14.21715654
192	3.83	0.690120522	0.754940801	0.80335	0.04840648	14.92707367
193	3.88	0.698425455	0.757544419	0.80753	0.04998696	15.28850117
194	3.95	0.711493797	0.761610853	0.81172	0.05010463	15.8659846
195	3.97	0.714334178	0.762489719	0.81590	0.05340986	15.99291584
196	4.07	0.732300078	0.768007284	0.82008	0.0520764	16.80749357

197	4.09	0.735043371	0.76884346	0.82427	0.05542432	16.93365561
198	4.15	0.746800278	0.772407936	0.82845	0.05604395	17.47969031
199	4.53	0.813693555	0.792089736	0.83264	0.04054625	20.75135905
200	4.54	0.816780417	0.792973037	0.83682	0.04384705	20.90910416
201	4.58	0.823513851	0.794892078	0.84100	0.04611211	21.25526913
202	4.63	0.83294568	0.797562317	0.84519	0.04762597	21.74493695
203	4.78	0.859139541	0.804868233	0.84937	0.04450415	23.13407862
204	5.38	0.96658384	0.833123942	0.85356	0.02043254	29.28221011
205	5.44	0.976997491	0.835714803	0.85774	0.02202578	29.91656245
206	5.60	1.006443812	0.842898936	0.86192	0.01902575	31.74708544
207	5.76	1.034288535	0.849499352	0.86611	0.01660943	33.52804367
208	6.16	1.105691466	0.865569957	0.87029	0.00472293	38.31710662
209	6.23	1.118124227	0.86824303	0.87448	0.00623396	39.18365174
210	6.26	1.12284642	0.869248637	0.87866	0.00941245	39.51532059
211	6.30	1.130679399	0.870904972	0.88285	0.01194022	40.0685615
212	6.55	1.17558825	0.880120273	0.88703	0.00690902	43.31469549
213	6.63	1.18912079	0.882803931	0.89121	0.00840946	44.31765134
214	6.64	1.190864555	0.883146619	0.89540	0.01225087	44.44772436
215	7.14	1.280293769	0.899779081	0.89958	0.00019749	51.37407979
216	7.20	1.29096142	0.901641472	0.90377	0.00212422	52.23376372
217	7.41	1.329013874	0.908078304	0.90795	0.00012851	55.35843725
218	7.42	1.331072727	0.908417459	0.91213	0.00371643	55.53008809
219	7.45	1.336504709	0.909307819	0.91632	0.00701017	55.98423896
220	7.58	1.358580117	0.91286016	0.92050	0.00764193	57.84892606
221	7.67	1.375135342	0.915455255	0.92469	0.00923094	59.26737337
222	8.39	1.503753713	0.933677603	0.92887	0.00480731	70.87257588
223	8.42	1.509448123	0.934407848	0.93305	0.00135346	71.41035233
224	8.56	1.535082294	0.937618193	0.93724	0.0003797	73.85639705
225	9.20	1.648459759	0.950370819	0.94142	0.00894822	85.16898902
226	9.36	1.677484185	0.95327608	0.94561	0.00766939	88.19453229
227	9.41	1.68664946	0.954164612	0.94979	0.00437382	89.1609025
228	9.63	1.725481071	0.957779594	0.95397	0.0038047	93.31365292
229	9.67	1.732449868	0.958403252	0.95816	0.00024426	94.06891714
230	10.82	1.938422706	0.973714164	0.96234	0.01137107	117.7665003
231	11.14	1.994924688	0.976974453	0.96653	0.01044726	124.731976
232	11.19	2.003542231	0.97744044	0.97071	0.00672914	125.8119212
233	11.42	2.045009744	0.979573051	0.97490	0.00467765	131.073699
234	11.55	2.068669849	0.980711461	0.97908	0.00163196	134.1242052
235	11.85	2.122210998	0.983089988	0.98326	0.00017361	141.1568356
236	12.16	2.177189101	0.985266769	0.98745	0.00218093	148.5652013

237	12.45	2.229536207	0.987110875	0.99163	0.00452092	155.7951206
238	14.62	2.6176895	0.995573634	0.99582	0.00024227	214.7637874
239	14.75	2.639153919	0.995844338	1.00000	0.00415566	218.3002492

N	239
Jumlah	-7.14
Rata - rata	-0.03
Simpangan Deviasi	5.59838
L_{hitung}	0.0673
L_{tabel}	0.057311
Keterangan	DATA BERDISTRIBUSI TIDAK NORMAL

b. Dengan Bantuan R-Studio 4.4.2

```
Lilliefors (Kolmogorov-Smirnov) normality test
data: sisaan.da
D = 0.067323, p-value = 0.0106
```

Kesimpulan:

Uji normalitas dilakukan terhadap residual model dengan jumlah data sebanyak 239, nilai rata-rata sebesar -0.03, dan simpangan baku sebesar 5.59838. Berdasarkan perhitungan diperoleh nilai statistik L_{hitung} sebesar 0.0673. Jika dibandingkan dengan nilai L_{tabel} pada taraf signifikansi 5% sebesar 0.057311, maka karena $L_{hitung} > L_{tabel}$, keputusan uji adalah menolak H_0 . Dengan demikian, dapat disimpulkan bahwa data residual tidak berdistribusi normal.

Lampiran 57 Hasil Uji Homoskedastisitas Residual pada ARIMA(2,1,4)

a. Dengan Bantuan Microsoft Excel 2016

<i>Residual</i> ²	Lag 0	Lag 1	Lag 2	Lag 3	Lag 4	Lag 6	Lag 7	Lag 8	Lag 9	Lag 10	Lag 11	Lag 12	Lag 13	Lag 14	Lag 15
*															
0.00	974.2														
1.15	903.5	938.2													
12.07	366.4	575.4	597.4												
7.12	580.6	461.2	724.2	752.0											
6.61	605.1	592.7	470.9	739.4	767.8										
13.83	302.0	427.5	418.8	332.7	522.4	542.4									
9.00	493.5	386.1	546.5	535.3	425.2	667.8	693.4								
0.17	963.6	689.6	539.5	763.6	748.0	594.2	933.1	968.9							
0.59	937.4	950.4	680.2	532.1	753.2	737.7	586.1	920.3	955.6						
93.49	3878.7	-1906.8	-	-	-	-	-	-	-	-					
15.08	260.1	-1004.4	493.8	500.7	358.3	280.3	396.7	388.6	308.7	484.8	503.4				
34.93	13.9	-60.0	231.8	-114.0	-115.6	-82.7	-64.7	-91.6	-89.7	-71.3	-111.9	-116.2			
2.63	816.6	-106.4	460.9	1779.7	874.9	887.1	634.8	496.6	703.0	688.5	547.0	859.0	891.9		
15.75	238.9	441.7	-57.5	249.3	-962.6	473.2	479.8	343.4	268.6	380.2	372.4	295.9	464.6	482.4	
4.05	737.9	419.9	776.3	-101.1	438.1	1691.8	831.7	843.3	603.5	472.1	668.2	654.5	520.0	816.5	847.9
1.60	877.1	804.5	457.8	846.3	-110.2	477.7	1844.5	906.7	919.3	657.9	514.7	728.5	713.6	566.9	890.2

0.01	973.7	924.2	847.7	482.3	891.7	-116.2	503.3	-	1943.4	955.4	968.7	693.2	542.3	767.6	751.9	597.3
20.48	115.2	334.9	317.8	291.5	165.9	306.7	-39.9	173.1	-668.3	328.6	333.1	238.4	186.5	264.0	258.6	
2.73	810.9	305.6	888.6	843.4	773.6	440.2	813.8	-106.0	459.3	1773.5	871.9	884.0	632.6	494.9	700.5	
0.90	918.7	863.1	325.3	945.8	897.6	823.4	468.5	866.1	-112.8	488.8	-1887.6	928.0	940.9	673.3	526.8	
20.80	108.4	315.5	296.5	111.7	324.9	308.3	282.8	160.9	297.5	-38.8	167.9	-648.4	318.7	323.2	231.3	
43.92	161.5	-132.3	-385.2	-361.9	-136.4	-396.6	-376.4	-345.2	-196.4	-363.2	47.3	-205.0	791.5	-389.1	-394.5	
17.29	193.9	-177.0	145.0	422.1	396.6	149.4	434.5	412.4	378.3	215.2	397.9	-51.8	224.6	-867.2	426.3	
4.31	723.5	374.6	-341.9	280.0	815.3	766.0	288.7	839.4	796.6	730.7	415.8	768.7	-100.1	433.8	-1675.2	
20.94	105.4	276.2	143.0	-130.5	106.9	311.2	292.4	110.2	320.4	304.1	278.9	158.7	293.4	-38.2	165.6	
0.03	972.4	320.2	838.8	434.2	-396.3	324.6	945.2	888.0	334.6	973.1	923.5	847.1	482.0	891.1	-116.1	
2.29	836.3	901.8	296.9	777.9	402.7	-367.5	301.1	876.5	823.5	310.3	902.4	856.5	785.6	447.0	826.4	
2.16	843.9	840.1	905.9	298.3	781.4	404.5	-369.2	302.4	880.5	827.3	311.8	906.5	860.4	789.2	449.0	
0.03	972.3	905.9	901.8	972.4	320.2	838.8	434.2	-396.3	324.6	945.1	888.0	334.6	973.0	923.5	847.1	
12.58	347.0	580.9	541.2	538.7	580.9	191.3	501.1	259.4	-236.8	193.9	564.6	530.5	199.9	581.3	551.7	
0.74	928.5	567.7	950.2	885.2	881.2	950.2	312.9	819.7	424.3	-387.3	317.2	923.6	867.8	327.0	950.9	
5.18	677.5	793.2	484.9	811.7	756.2	752.8	811.7	267.3	700.2	362.5	-330.8	271.0	788.9	741.2	279.3	
11.51	388.0	512.7	600.2	366.9	614.2	572.2	569.6	614.2	202.2	529.8	274.3	-250.3	205.1	597.0	560.9	
0.63	935.5	602.5	796.1	932.0	569.8	953.8	888.6	884.5	953.8	314.1	822.7	425.9	-388.7	318.4	927.1	
3.07	791.7	860.6	554.2	732.4	857.4	524.2	877.4	817.4	813.7	877.4	288.9	756.9	391.8	-357.6	292.9	
19.42	139.0	331.7	360.6	232.2	306.9	359.3	219.6	367.6	342.5	341.0	367.7	121.1	317.1	164.2	-149.8	
24.74	41.8	76.3	182.0	197.8	127.4	168.4	197.1	120.5	201.7	187.9	187.1	201.7	66.4	174.0	90.1	
0.13	966.0	201.0	366.5	874.5	950.7	612.2	809.0	947.1	579.0	969.2	902.9	898.9	969.2	319.1	836.0	
0.26	957.9	961.9	200.2	364.9	870.8	946.6	609.6	805.6	943.1	576.6	965.1	899.1	895.0	965.1	317.8	

0.15	964.7	961.3	965.4	200.9	366.2	874.0	950.0	611.8	808.5	946.5	578.6	968.5	902.3	898.2	968.6
2.87	803.3	880.3	877.2	880.9	183.3	334.2	797.5	866.9	558.3	737.7	863.7	528.0	883.8	823.4	819.7
9.51	470.9	615.0	674.0	671.6	674.5	140.4	255.9	610.6	663.7	427.4	564.8	661.2	404.3	676.7	630.4
0.45	946.2	667.5	871.8	955.4	952.0	956.1	199.0	362.7	865.5	940.8	605.9	800.7	937.3	573.0	959.2
8.82	501.2	688.6	485.8	634.5	695.3	692.9	695.8	144.8	264.0	629.9	684.7	441.0	582.7	682.2	417.0
88.60	3293.2	-1284.7	-	-	-	-	-	-	-	-371.2	-676.6	-1614.7	1755.2	1130.3	-1493.7
18.50	161.6	-729.5	284.6	391.1	275.9	360.3	394.9	393.5	395.1	82.2	149.9	357.7	388.8	250.4	330.9
14.70	272.7	209.9	-947.7	369.7	508.0	358.4	468.1	512.9	511.1	513.3	106.8	194.7	464.7	505.1	325.3
6.22	624.7	412.8	317.8	1434.3	559.6	768.8	542.4	708.4	776.3	773.6	776.9	161.7	294.7	703.3	764.5
13.27	321.8	448.4	296.3	228.1	-	1029.5	401.6	551.8	389.3	508.5	557.2	555.2	557.6	116.0	211.5
4.41	718.2	480.8	669.8	442.6	340.7	1537.9	600.0	824.4	581.5	759.6	832.4	829.4	833.0	173.3	316.0
0.87	920.6	813.1	544.3	758.4	501.1	385.7	1741.2	679.3	933.3	658.4	860.0	942.4	939.1	943.1	196.2
0.01	973.8	946.9	836.3	559.8	780.0	515.4	396.7	1790.8	698.6	959.9	677.2	884.5	969.3	965.8	969.9
2.95	798.7	881.9	857.5	757.4	507.0	706.4	466.7	359.3	1621.8	632.7	869.3	613.3	801.0	877.8	874.7
31.41	0.0	-5.6	-6.2	-6.1	-5.4	-3.6	-5.0	-3.3	-2.5	11.5	-4.5	-6.1	-4.3	-5.7	-6.2
7.95	541.0	-4.6	657.3	725.8	705.7	623.3	417.2	581.3	384.1	295.7	-1334.7	520.7	715.4	504.7	659.2
25.82	29.0	125.3	-1.1	152.2	168.1	163.4	144.4	96.6	134.6	89.0	68.5	-309.1	120.6	165.7	116.9
55.54	591.8	-131.0	-565.8	4.9	-687.5	-759.2	-738.1	-651.9	-436.4	-608.0	-401.7	-309.3	1396.0	-544.6	-748.3
28.55	7.1	-64.7	14.3	61.9	-0.5	75.2	83.0	80.7	71.3	47.7	66.5	43.9	33.8	-152.7	59.6

2.82	806.0	75.5	-690.6	152.9	660.3	-5.7	802.3	886.0	861.4	760.8	509.3	709.6	468.8	360.9	-1629.2
0.05	970.9	884.6	82.9	-758.0	167.8	724.7	-6.2	880.6	972.4	945.4	835.1	559.0	778.8	514.6	396.1
27.45	14.2	117.3	106.9	10.0	-91.6	20.3	87.6	-0.8	106.4	117.5	114.2	100.9	67.5	94.1	62.2
6.64	603.9	92.5	765.7	697.7	65.4	-597.8	132.4	571.6	-4.9	694.5	766.9	745.6	658.6	440.9	614.2
0.20	961.8	762.1	116.8	966.4	880.5	82.5	-754.5	167.1	721.3	-6.2	876.5	967.8	941.0	831.1	556.4
4.88	693.1	816.5	647.0	99.1	820.3	747.4	70.0	-640.5	141.8	612.3	-5.3	744.0	821.6	798.8	705.6
1.26	897.4	788.7	929.1	736.2	112.8	933.4	850.5	79.7	-728.7	161.4	696.7	-6.0	846.6	934.8	908.9
7.74	551.0	703.2	618.0	728.0	576.9	88.4	731.4	666.4	62.5	-571.0	126.4	546.0	-4.7	663.4	732.5
5.45	663.8	604.8	771.8	678.3	799.0	633.1	97.0	802.8	731.4	68.5	-626.7	138.8	599.2	-5.2	728.1
20.64	111.8	272.4	248.2	316.8	278.4	328.0	259.9	39.8	329.5	300.2	28.1	-257.2	57.0	246.0	-2.1
0.54	940.6	324.3	790.2	719.9	918.7	807.4	951.2	753.7	115.5	955.6	870.7	81.6	-746.1	165.2	713.3
11.08	405.1	617.3	212.8	518.6	472.5	602.9	529.9	624.2	494.6	75.8	627.2	571.4	53.6	-489.6	108.4
16.69	210.9	292.3	445.4	153.6	374.2	340.9	435.0	382.3	450.4	356.9	54.7	452.5	412.3	38.6	-353.3
0.56	939.3	445.1	616.9	940.0	324.1	789.6	719.4	918.1	806.9	950.5	753.2	115.4	955.0	870.1	81.5
65.62	1183.9	-1054.5	-499.7	-692.6	-	1055.3	-363.9	-886.5	-807.7	1030.7	-905.9	-1067.1	-845.6	-129.6	-1072.1
33.16	3.8	67.1	-59.7	-28.3	-39.2	-59.8	-20.6	-50.2	-45.8	-58.4	-51.3	-60.5	-47.9	-7.3	-60.7
147.84	13601.8	227.4	4012.9	3574.4	1693.7	2347.4	3576.9	1233.3	3004.7	2737.7	-3493.7	3070.5	3617.0	-2866.0	-439.1
15.63	242.8	-1817.3	-30.4	-536.2	477.6	226.3	313.6	477.9	164.8	401.5	365.8	466.8	410.2	483.3	382.9
0.01	973.6	486.2	3639.1	-60.8	1073.6	956.3	453.2	628.0	957.0	330.0	803.9	732.5	934.7	821.5	967.7
5.74	649.0	794.9	397.0	2971.2	-49.7	-876.6	780.8	370.0	512.8	781.3	269.4	656.4	598.0	763.2	670.7
4.21	728.9	687.8	842.4	420.7	3148.7	-52.6	-929.0	827.4	392.1	543.4	828.0	285.5	695.6	633.8	808.8

133.43	10449.3	-2759.8	-	-	-	11921.8	199.3	3517.2	-	-	-2057.5	-	-	-2633.6	-2399.6
31.02	0.0	-19.7	5.2	4.9	6.0	3.0	-22.5	-0.4	-6.6	5.9	2.8	3.9	5.9	2.0	5.0
27.50	13.8	0.7	-379.2	100.2	94.5	115.8	57.8	-432.7	-7.2	-127.7	113.7	53.9	74.7	113.8	39.2
0.31	955.1	114.7	6.0	-	3159.2	834.4	787.3	964.3	481.6	3604.4	-60.2	-1063.4	947.2	448.8	622.0
29.12	4.4	64.8	7.8	0.4	-214.2	56.6	53.4	65.4	32.6	-244.4	-4.1	-72.1	64.2	30.4	42.2
0.53	941.2	64.3	948.1	113.8	5.9	-	3136.0	828.3	781.6	957.3	478.0	-3577.9	-59.8	-	1055.6
0.09	968.5	954.7	65.2	961.8	115.5	6.0	3181.2	840.2	792.8	971.1	484.9	-	3629.4	-60.7	-1070.8
0.13	966.0	967.2	953.5	65.1	960.5	115.3	6.0	-	3177.1	839.1	791.8	969.8	484.3	-	-1069.4
11.68	381.4	607.0	607.7	599.1	40.9	603.5	72.5	3.8	-	1996.2	527.2	497.5	609.3	304.3	-2277.5
38.81	57.7	-148.4	-236.2	-236.5	-233.1	-15.9	-234.9	-28.2	-1.5	776.8	-205.2	-193.6	-237.1	-118.4	886.3
6.70	600.8	-186.3	478.7	761.8	762.8	752.0	51.4	757.5	90.9	4.7	-2505.5	661.7	624.4	764.8	381.9
22.05	83.9	224.5	-69.6	178.8	284.6	285.0	280.9	19.2	283.0	34.0	1.8	-936.1	247.2	233.3	285.7
54.92	561.9	-217.1	-581.0	180.1	-462.9	-736.7	-737.7	-727.2	-49.7	-732.6	-87.9	-4.6	2423.0	-639.9	-603.9
0.04	971.4	-738.8	285.4	763.9	-236.8	608.7	968.7	969.9	956.2	65.3	963.2	115.6	6.0	-3186.0	841.5
1.19	901.3	935.7	-711.6	274.9	735.8	-228.1	586.3	933.1	934.3	921.0	62.9	927.8	111.4	5.8	-3068.8
0.40	949.5	925.1	960.4	-730.4	282.2	755.3	-234.2	601.8	957.7	959.0	945.3	64.6	952.3	114.3	5.9
129.26	9613.7	-3021.4	-	-	2324.1	-897.9	-	-	-	-	-	-	-	-	-
26.96	18.0	-416.4	130.9	127.5	132.4	-100.7	38.9	104.1	-32.3	82.9	132.0	132.2	130.3	8.9	131.2
2.63	816.7	121.4	-	880.6	857.9	890.7	-677.4	261.7	700.5	-217.2	558.1	888.2	889.4	876.7	59.9

2.99	796.7	806.6	119.9	-	2767.5	869.8	847.4	879.7	-669.0	258.5	691.8	-214.5	551.2	877.3	878.4	865.9
37.95	45.4	-190.1	-192.5	-28.6	660.5	-207.6	-202.2	-210.0	159.7	-61.7	-165.1	51.2	-131.6	-209.4	-209.6	
4.72	701.6	-178.4	747.6	757.0	112.5	-	2597.2	816.2	795.2	825.6	-627.9	242.6	649.3	-201.3	517.3	823.3
1.86	861.8	777.6	-197.8	828.6	838.9	124.7	-	2878.3	904.6	881.3	915.0	-695.8	268.8	719.5	-223.1	573.3
51.80	424.0	-604.5	-545.4	138.7	-581.2	-588.5	-87.4	2019.0	-634.5	-618.2	-641.8	488.1	-188.6	-504.7	156.5	
0.90	919.0	-624.2	889.9	803.0	-204.2	855.6	866.3	128.7	-	2972.4	934.1	910.1	944.8	-718.6	277.6	743.0
16.56	214.6	444.1	-301.6	430.0	388.0	-98.7	413.4	418.6	62.2	-	1436.2	451.4	439.7	456.5	-347.2	134.1
11.53	387.3	288.3	596.6	-405.3	577.7	521.3	-132.6	555.5	562.4	83.6	-1929.7	606.5	590.8	613.4	-466.5	
33.18	3.9	-38.8	-28.9	-59.8	40.6	-57.9	-52.2	13.3	-55.6	-56.3	-8.4	193.3	-60.8	-59.2	-61.4	
96.64	4280.5	129.0	1287.6	-958.4	-	1983.4	1347.2	1920.6	-	-	1846.7	-1869.7	-277.8	6414.9	-2016.0	-1964.1
47.40	262.1	1059.1	31.9	-318.6	-237.1	-490.8	333.3	-475.2	-428.8	109.1	-456.9	-462.6	-68.8	1587.3	-498.8	
2.24	839.2	-469.0	1895.3	-57.1	570.1	424.3	878.2	-596.5	850.4	767.4	-195.2	817.7	827.9	123.0	-2840.4	
6.77	597.5	708.1	-395.7	1599.2	-48.2	481.1	358.0	741.0	-503.3	717.6	647.5	-164.7	689.9	698.5	103.8	
1.65	873.9	722.6	856.4	-478.6	-	1934.1	-58.3	581.8	433.0	896.2	-608.7	867.8	783.0	-199.1	834.4	844.8
125.14	8823.1	-2776.8	-	-	2721.1	1520.6	6145.5	185.2	-	-	-	1934.2	2757.4	2488.1	632.8	-2651.2
75.37	1949.7	4147.6	-	-	-	1279.2	714.8	2888.9	87.1	-869.0	-646.8	-1338.6	909.2	1296.2	-1169.6	297.5

155.05	15336.1	5468.2	11632.4	-3660.9	-3027.1	-3587.5	2004.8	8102.2	244.2	-2437.2	-1814.0	-3754.2	2550.0	-3635.4	-3280.3
73.00	1746.6	5175.6	1845.4	3925.7	-1235.5	-1021.6	-1210.7	676.6	2734.3	82.4	-822.5	-612.2	-1266.9	860.6	-1226.9
70.37	1533.4	1636.6	4849.4	1729.1	3678.3	-1157.6	-957.2	-1134.4	633.9	2562.0	77.2	-770.7	-573.6	-1187.1	806.3
1.00	912.5	-1182.9	-1262.4	3740.8	-1333.8	-2837.4	893.0	738.4	875.1	-489.0	-1976.3	-59.6	594.5	442.5	915.7
21.47	95.0	294.3	-381.6	-407.2	-1206.7	-430.3	-915.3	288.1	238.2	282.3	-157.7	-637.5	-19.2	191.8	142.7
109.36	6106.8	-761.5	-2360.6	3060.1	3266.0	9677.5	3450.6	7340.4	2310.1	-1910.2	-2263.8	1265.1	5112.7	154.1	-1538.0
225.98	37933.2	15220.1	-1897.8	-5883.3	7626.8	8139.8	24119.4	8599.9	18294.5	-5757.5	-4760.7	-5642.2	3153.0	12742.5	384.0
43.21	143.8	2335.9	937.3	-116.9	-362.3	469.7	501.2	1485.3	529.6	1126.6	-354.6	-293.2	-347.4	194.2	784.7
0.86	921.4	-364.1	-5912.1	-2372.1	295.8	916.9	-1188.7	-1268.6	3759.2	-1340.4	-2851.3	897.3	742.0	879.4	-491.4
0.77	926.6	924.0	-365.1	5928.8	2378.8	296.6	919.5	-1192.0	1272.2	3769.8	-1344.1	2859.3	899.9	744.1	881.9
55.09	570.0	-726.8	-724.7	286.3	4649.9	1865.7	-232.6	-721.2	934.9	997.8	2956.6	1054.2	2242.6	-705.8	-583.6
3.64	760.3	-658.3	839.3	837.0	-330.7	5370.2	2154.7	268.7	832.9	1079.7	-1152.3	3414.6	1217.5	-2590.0	815.1
57.40	685.6	-722.0	625.1	-797.1	-794.8	314.0	5099.7	2046.2	-255.1	-790.9	1025.3	1094.3	3242.6	1156.2	2459.5
4.68	704.1	-694.8	731.6	-633.5	807.7	805.5	-318.2	5167.9	2073.6	258.6	801.5	1039.1	1108.9	-3286.0	-1171.6
1.94	856.9	776.7	-766.5	807.1	-698.9	891.1	888.6	-351.1	5701.4	-2287.6	285.2	884.3	1146.3	-1223.4	-3625.2

8.39	520.7	667.9	605.5	-597.5	629.2	-544.8	694.6	692.6	-273.7	-	4444.1	-1783.1	222.3	689.3	-893.5	-953.6
124.07	8621.9	-2118.7	-	-	2431.3	2560.3	2216.8	2826.6	2818.6	1113.7	18084.7	7256.2	-904.8	-2804.9	3636.1	
64.01	1075.9	3045.7	-748.4	-960.2	-870.4	858.9	-904.4	783.1	-998.5	-995.7	393.4	6388.5	2563.3	-319.6	-990.8	
45.11	193.2	456.0	1290.7	-317.2	-406.9	-368.8	364.0	-383.3	331.9	-423.2	-422.0	166.7	2707.4	1086.3	-135.5	
0.14	965.6	-432.0	1019.3	2885.3	709.0	909.6	824.5	-813.6	856.8	-741.9	945.9	943.3	-372.7	-6052.1	-2428.3	
3.93	744.5	847.9	-379.3	-895.0	2533.6	622.6	798.8	724.0	-714.5	752.4	-651.4	830.6	828.3	-327.3	-5314.4	
13.99	296.5	469.8	535.1	-239.4	-564.8	1598.8	392.9	504.0	456.9	-450.9	474.8	-411.1	524.2	522.7	-206.5	
16.16	226.7	259.2	410.8	467.8	-209.3	-493.8	1397.9	343.5	440.7	399.5	-394.2	415.1	-359.4	458.3	457.0	
44.05	164.8	-193.3	-221.1	-350.3	-399.0	178.5	421.1	1192.1	-293.0	-375.8	-340.7	336.2	-354.0	306.5	-390.8	
3.25	781.7	-359.0	420.9	481.4	762.9	868.8	-388.7	-917.1	2596.2	638.0	818.5	741.9	-732.1	770.9	-667.5	
13.12	327.2	505.8	-232.2	272.3	311.5	493.6	562.1	-251.5	-593.4	1679.7	412.8	529.5	480.0	-473.7	498.8	
4.41	718.5	484.9	749.4	-344.1	403.6	461.5	731.4	832.9	-372.6	-879.2	-2488.9	611.6	784.7	711.2	-701.9	
10.17	442.9	564.1	380.7	588.4	-270.2	316.8	362.4	574.3	654.0	-292.5	-690.3	-	1954.2	480.2	616.1	558.4
29.59	2.6	34.1	43.4	29.3	45.3	-20.8	24.4	27.9	44.2	50.4	-22.5	-53.2	-150.5	37.0	47.4	
16.57	214.3	23.7	308.1	392.4	264.8	409.3	-188.0	220.4	252.1	399.5	454.9	-203.5	-480.2	-1359.4	334.1	
32.52	1.7	-19.2	-2.1	-27.6	-35.1	-23.7	-36.7	16.8	-19.7	-22.6	-35.8	-40.7	18.2	43.0	121.7	
2.94	799.0	-37.1	413.8	45.8	594.9	757.7	511.3	790.3	-362.9	425.6	486.7	771.3	878.4	-392.9	-927.2	
1.02	911.4	853.3	-39.6	442.0	48.9	635.3	809.2	546.1	844.1	-387.6	454.5	519.8	823.7	938.1	-419.6	

6.74	598.8	738.7	691.7	-32.1	358.3	39.7	515.0	655.9	442.6	684.2	-314.2	368.4	421.3	667.7	760.4
140.45	11932.6	-2673.0	3297.7	3087.8	143.2	1599.3	-177.0	2298.9	2928.1	1976.0	-3054.2	1402.5	1644.6	-1880.9	-2980.7
22.85	70.0	-913.6	204.7	252.5	236.4	-11.0	122.5	13.6	176.0	224.2	151.3	233.8	-107.4	125.9	144.0
86.29	3033.6	-460.7	6016.5	1347.7	1662.7	1556.9	72.2	-806.4	-89.3	1159.1	-1476.3	-996.3	1539.9	707.1	-829.2
0.45	946.2	-1694.2	257.3	3360.2	752.7	928.6	869.5	-40.3	450.3	49.9	647.4	824.5	556.4	860.0	-394.9
3.82	750.1	842.5	1508.5	229.1	2991.7	670.2	826.8	774.2	-35.9	401.0	44.4	576.4	734.1	495.4	765.7
2.93	799.8	774.5	869.9	1557.6	236.5	3089.3	692.0	853.8	799.4	-37.1	414.0	45.8	595.2	758.1	511.6
17.23	195.5	395.4	382.9	430.1	-770.0	116.9	1527.2	342.1	422.1	395.2	-18.3	204.7	22.7	294.2	374.7
56.48	638.7	-353.3	-714.7	-692.2	-777.4	1392.0	-211.4	2760.7	-618.4	-762.9	-714.4	33.1	-370.0	-41.0	-531.9
68.76	1410.0	949.0	-525.0	1062.0	1028.4	1155.1	2068.2	-314.1	4101.9	-918.9	-1133.6	1061.4	49.2	-549.8	-60.9
8.29	525.3	-860.6	-579.2	320.4	648.2	627.7	705.0	1262.3	191.7	2503.6	560.8	691.9	647.8	-30.0	335.5
15.06	261.0	370.3	-606.7	-408.3	225.9	456.9	442.5	497.0	-889.8	135.1	-1764.8	395.3	487.7	456.7	-21.2
15.90	234.4	247.4	350.9	-574.9	-387.0	214.1	433.0	419.3	471.0	-843.3	128.1	1672.5	374.7	462.2	432.8
7.71	552.1	359.8	379.6	538.5	-882.3	-593.8	328.5	664.5	643.5	722.8	-1294.1	196.5	2566.7	575.0	709.3
58.81	761.6	-648.4	-422.5	-445.8	-632.5	1036.3	697.4	-385.8	-780.5	-755.8	-848.9	1520.0	-230.8	3014.6	-675.3
0.09	968.6	-858.9	731.3	476.5	502.8	713.3	1168.7	-786.5	435.1	880.2	852.4	957.3	1714.1	260.3	-3399.7

0.67	932.5	950.4	-842.7	717.5	467.6	493.4	699.9	-	1146.7	-771.8	426.9	863.6	836.3	939.3	-1681.9	255.4
6.40	615.7	757.7	772.2	-684.8	583.0	379.9	400.9	568.7	-931.8	-627.1	346.9	701.7	679.6	763.3	-1366.7	
0.01	973.5	774.2	952.8	971.0	-861.0	733.1	477.7	504.1	715.1	-	1171.6	-788.5	436.2	882.4	854.5	959.7
42.92	137.1	-365.4	-290.6	-357.6	-364.5	323.2	-275.2	-179.3	-189.2	-268.4	439.8	296.0	-163.7	-331.2	-320.7	
22.50	76.0	-102.1	271.9	216.3	266.2	271.3	-240.5	204.8	133.4	140.8	199.8	-327.3	-220.3	121.9	246.5	
33.78	6.6	-22.4	30.1	-80.1	-63.7	-78.4	-79.9	70.9	-60.3	-39.3	-41.5	-58.9	96.4	64.9	-35.9	
7.52	561.5	-60.9	206.5	-277.5	739.3	588.0	723.6	737.5	-653.9	556.8	362.8	382.8	543.1	-889.8	-598.9	
2.68	813.9	676.0	-73.3	248.7	-334.1	890.1	707.9	871.2	887.9	-787.3	670.3	436.8	460.9	653.9	-1071.3	
20.20	121.3	314.2	261.0	-28.3	96.0	-129.0	343.7	273.3	336.3	342.8	-304.0	258.8	168.6	177.9	252.4	
130.39	9836.5	-1092.4	-	-	254.7	-864.4	1161.5	-	-	-	-3086.7	2737.0	2330.4	-1518.6	-1602.3	
6.70	600.6	-2430.7	269.9	699.2	580.7	-62.9	213.6	-287.0	764.7	608.1	748.4	762.7	-676.3	575.9	375.2	
30.37	0.7	20.7	-83.9	9.3	24.1	20.0	-2.2	7.4	-9.9	26.4	21.0	25.8	26.3	-23.3	19.9	
0.01	973.3	26.4	764.6	3094.2	343.6	890.1	739.3	-80.1	271.9	-365.4	973.4	774.1	952.7	971.0	-861.0	
0.51	942.5	957.8	26.0	752.4	3044.8	338.1	875.8	727.5	-78.8	267.6	-359.5	957.9	761.8	937.5	955.5	
0.05	971.1	956.7	972.2	26.4	763.7	3090.7	343.2	889.0	738.4	-80.0	271.6	-364.9	972.3	773.3	951.6	
7.68	553.6	733.2	722.3	734.1	19.9	576.6	2333.6	259.2	671.2	557.5	-60.4	205.1	-275.5	734.1	583.8	
24.44	45.8	159.2	210.9	207.8	211.1	5.7	165.9	-671.2	74.5	193.1	160.4	-17.4	59.0	-79.3	211.2	
23.43	60.6	52.7	183.1	242.5	238.9	242.8	6.6	190.7	-771.8	85.7	222.0	184.4	-20.0	67.8	-91.1	
8.27	526.4	178.5	155.3	539.8	715.0	704.4	715.8	19.4	562.3	-	2275.6	252.7	654.6	543.7	-58.9	200.0

0.83	923.2	697.1	236.4	205.6	714.9	946.9	932.8	947.9	25.7	744.7	-3013.5	334.7	866.8	720.0	-78.0
45.90	215.7	-446.2	-336.9	-114.3	-99.4	-345.5	-457.6	-450.8	-458.2	-12.4	-359.9	1456.5	-161.8	-419.0	-348.0
217.42	34673.1	2734.5	-	-	-	-	-	-	-	-	-	-	18467.9	-2051.0	-5312.3
12.87	336.4	-3415.3	-269.4	557.3	420.8	142.7	124.1	431.5	571.6	563.1	572.2	15.5	449.5	-1819.1	202.0
5.27	673.1	475.9	4831.1	-381.0	788.3	595.3	201.9	175.6	610.4	808.5	796.5	809.4	21.9	635.9	-2573.2
4.34	722.1	697.2	492.9	5003.7	-394.6	816.5	616.5	209.1	181.9	632.2	837.4	825.0	838.3	22.7	658.6
3.68	757.8	739.7	714.2	504.9	-	5126.0	-404.3	836.4	631.6	214.2	186.3	647.7	857.9	845.1	858.8
0.01	973.4	858.9	838.4	809.5	-	572.3	5809.7	-458.2	948.0	715.9	242.8	211.2	734.1	972.3	957.8
39.14	62.9	-247.4	-218.3	-213.1	-205.7	-145.4	1476.5	116.4	-240.9	-181.9	-61.7	-53.7	-186.6	-247.1	-243.4
39.52	69.0	65.9	-259.2	-228.7	-223.2	-215.6	-152.4	1547.0	122.0	-252.4	-190.6	-64.6	-56.2	-195.5	-258.9
51.97	431.0	172.5	164.6	-647.8	-571.5	-557.9	-538.7	-380.8	3865.9	304.9	-630.8	-476.3	-161.6	-140.5	-488.5
42.10	118.5	226.0	90.5	86.3	-339.7	-299.7	-292.6	-282.5	-199.7	2027.3	159.9	-330.8	-249.8	-84.7	-73.7
711.51	462799.9	7406.6	14123.8	5651.9	5394.2	-	21225.2	18727.3	18280.5	17650.2	12477.6	126675.7	9990.4	-	-
431.25	160032.9	272145.6	4355.4	8305.4	3323.5	3172.0	-	12481.3	11012.4	10749.7	10379.0	74490.6	5874.8	-12155.1	-9178.5
30.01	1.4	-480.8	-817.7	-13.1	-25.0	-10.0	-9.5	37.5	33.1	32.3	31.2	22.0	-223.8	-17.7	36.5
0.32	954.5	37.1	-	-	-	-	-	-	-	-	-	-	-	-	-
			12359.5	21018.0	-336.4	-641.4	-256.7	-245.0	963.9	850.5	830.2	801.6	566.7	-5753.0	-453.7

0.90	918.6	936.4	36.4	-12124.3	-20618.2	-330.0	-629.2	-251.8	-240.3	945.6	834.3	814.4	786.3	555.9	-5643.5
72.73	1723.7	-1258.3	1282.7	-49.9	16608.6	28243.9	452.0	862.0	344.9	329.2	-1295.3	1142.9	1115.6	-1077.2	-761.5
4.13	733.2	-1124.2	820.6	836.6	32.5	-10832.0	-18420.4	-294.8	-562.2	-225.0	-214.7	844.8	745.4	727.6	702.5
87.63	3183.6	-1527.8	2342.5	-1710.1	-1743.2	-67.8	22571.5	38384.2	614.3	1171.4	468.8	447.4	-1760.4	-1553.2	-1516.2
1.51	882.2	-1675.9	804.2	-1233.1	900.2	917.7	35.7	-11882.1	-20206.2	-323.4	-616.7	-246.8	-235.5	926.7	817.6
55.69	599.3	-727.1	1381.2	-662.9	1016.3	-741.9	-756.3	-29.4	9793.1	16653.7	266.5	508.2	203.4	194.1	-763.8
26.96	18.1	-104.0	126.2	-239.7	115.0	-176.4	128.8	131.3	5.1	1699.7	-2890.4	-46.3	-88.2	-35.3	-33.7
20.98	104.7	43.5	-250.5	303.9	-577.3	277.0	-424.8	310.1	316.1	12.3	-4092.7	6959.9	-111.4	-212.4	-85.0
6.68	601.6	250.9	104.2	-600.4	728.5	1383.9	664.1	-1018.3	743.4	757.8	29.5	9812.1	-16686.1	-267.0	-509.2
0.12	966.4	762.5	318.0	132.1	-761.0	923.3	1754.0	841.7	-1290.6	942.2	960.4	37.4	-12436.0	-21148.2	-338.5
39.69	71.9	-263.6	-208.0	-86.8	-36.0	207.6	-251.9	478.5	-229.6	352.1	-257.0	-262.0	-10.2	3392.3	5768.8
363.18	110205.0	2815.1	-10320.0	-8142.5	-3396.3	-1410.5	8126.7	-9860.3	18730.8	-8988.8	13782.5	-10061.3	-10256.4	-399.0	132802.2

2.12	846.5	-9658.4	-246.7	904.4	713.6	297.7	123.6	-712.2	864.2	-	787.8	-	881.8	898.9	35.0
84.62	2852.3	-1553.8	17729.7	452.9	-	-	-546.4	-226.9	1307.4	-	3013.4	-	2217.3	-1618.6	-1650.0
92.74	3785.5	3285.9	-	20424.9	521.7	-	-	-629.5	-261.4	1506.2	-1827.5	3471.5	-	2554.4	-1864.7
1.19	901.2	-1847.0	-	873.4	9965.9	-254.6	933.2	736.3	307.1	127.6	-734.9	891.7	-	812.9	-1246.4
28.96	5.1	67.6	-138.5	-120.3	65.5	-747.5	-19.1	70.0	55.2	23.0	9.6	-55.1	66.9	-127.0	61.0
4.22	728.3	60.8	810.2	-	1660.4	-	-	-228.8	839.0	661.9	276.1	114.7	-660.7	801.6	-1522.7
5.92	639.9	682.7	57.0	759.4	-	-	-	-	-214.5	786.4	620.4	258.8	107.5	-619.2	751.3
73.34	1775.1	-1065.8	-	-94.9	1264.8	2592.2	2250.2	-	13986.8	357.3	-1309.8	-	-431.0	-179.0	1031.4
0.15	964.7	-1308.6	785.7	838.2	69.9	932.4	1911.0	-	903.7	-	-263.4	965.6	761.8	317.8	132.0
213.89	33371.2	-5673.9	7696.7	4620.9	4930.0	-411.3	5484.1	11239.5	9756.3	5314.9	60643.8	1549.1	5678.9	-4480.7	-1868.9
1.17	902.6	-5488.1	933.1	1265.8	759.9	810.8	67.6	901.9	1848.4	1604.5	874.1	9973.3	-254.8	933.9	736.9
3.57	763.9	830.4	-	858.5	1164.5	699.2	745.9	62.2	829.8	1700.6	-1476.2	804.2	-	-234.4	859.2
0.01	973.7	862.5	937.4	5700.3	969.2	-	1314.7	789.3	842.1	70.3	936.8	-	907.9	-10358.8	-264.6
0.50	943.4	958.4	848.9	922.7	5610.9	954.0	1294.1	776.9	828.9	69.2	922.1	-	-	893.6	-

13.69	307.1	538.3	546.9	484.4	526.5	-	3201.5	544.3	-738.4	443.3	473.0	39.5	526.1	-	1078.3	-936.0	509.9
5.43	664.5	451.8	791.7	804.4	712.5	774.4	4709.0	800.6	1086.1	652.1	695.7	58.0	773.8	-1586.0	-1376.7		
50.95	389.5	-508.7	-345.9	-606.2	-615.8	-545.5	-592.9	3605.2	-613.0	831.5	-499.2	-532.6	-44.4	-592.5	1214.2		
13.67	307.7	-346.2	452.1	307.4	538.7	547.3	484.8	527.0	3204.2	544.8	-739.0	443.7	473.4	39.5	526.6		
17.59	185.7	239.0	-268.9	351.2	238.8	418.5	425.2	376.6	409.4	2489.2	423.2	-574.1	344.7	367.7	30.7		
2.07	849.4	397.1	511.2	-575.2	751.3	510.8	895.2	909.4	805.5	875.6	-5324.0	905.2	-	1227.9	737.2	786.5	
70.91	1575.7	-1156.9	-540.9	-696.3	783.4	1023.2	-695.7	1219.2	1238.6	1097.2	-1192.5	7251.4	1232.9	1672.4	-1004.1		
5.55	658.4	-1018.6	747.8	349.6	450.1	-506.4	661.4	449.7	788.1	800.7	709.2	770.9	-	4687.4	797.0	-1081.1	
5.58	656.9	657.7	1017.4	747.0	349.2	449.6	-505.8	660.7	449.2	787.2	799.8	708.4	770.0	-4682.0	796.1		
1.27	896.6	767.4	768.3	1188.6	872.6	408.0	525.2	-590.9	771.8	524.8	919.7	934.3	827.6	899.6	-5469.9		
10.30	437.3	626.2	536.0	536.6	-830.1	609.5	285.0	366.8	-412.7	539.1	366.5	642.3	652.6	578.0	628.3		
0.85	921.8	634.9	909.1	778.1	779.0	1205.2	884.8	413.7	532.5	-599.2	782.6	532.1	932.5	947.4	839.2		
2.16	843.8	881.9	607.5	869.8	744.5	745.4	1153.1	846.6	395.8	509.5	-573.3	748.8	509.1	892.2	906.4		
11.47	389.7	573.4	599.3	412.8	591.1	505.9	506.5	-783.6	575.3	269.0	346.2	-389.6	508.9	346.0	606.3		
117.12	7380.1	-1695.9	2495.5	2608.2	1796.6	2572.3	2201.8	2204.4	3410.1	2503.7	-1170.6	1506.8	1695.4	-2214.5	-1505.6		

<i>lag</i>	<i>Denominator</i>	<i>Numerator</i>	<i>ACF</i>
1	1095528.03	1095528.0	1.000
2	1095528.03	320386.2	0.292
3	1095528.03	38563.3	0.035
4	1095528.03	-53966.7	-0.049
5	1095528.03	919.9	0.001
6	1095528.03	32942.5	0.030
7	1095528.03	17691.2	0.016
8	1095528.03	40889.9	0.037
9	1095528.03	30500.5	0.028
10	1095528.03	-47457.1	-0.043
11	1095528.03	186703.9	0.170
12	1095528.03	95465.5	0.087
13	1095528.03	2286.3	0.002
14	1095528.03	-47738.6	-0.044
15	1095528.03	85381.9	0.078



PACF (2)	PACF (3)	PACF (4)	PACF (5)	PACF (6)	PACF (7)	PACF (8)	PACF (9)	PACF (10)	PACF (11)	PACF (12)	PACF (13)	PACF (14)	PACF (15)
0.2924	0.3085	0.3059	0.3076	0.3068	0.3069	0.3070	0.3066	0.3072	0.3210	0.3285	0.3273	0.3271	0.3279

	-0.0550	-0.0401	-0.0387	-0.0375	-0.0374	-0.0382	-0.0381	-0.0359	-0.0424	-0.0467	-0.0386	-0.0387	-0.0351
		-0.0483	-0.0589	-0.0580	-0.0582	-0.0593	-0.0595	-0.0605	-0.0680	-0.0668	-0.0713	-0.0697	-0.0672
			0.0346	0.0278	0.0277	0.0300	0.0297	0.0312	0.0354	0.0370	0.0382	0.0372	0.0106
				0.0219	0.0230	0.0244	0.0250	0.0268	0.0208	0.0199	0.0216	0.0218	0.0371
					-0.0036	-0.0155	-0.0151	-0.0187	-0.0258	-0.0251	-0.0260	-0.0256	-0.0297
						0.0387	0.0356	0.0333	0.0469	0.0481	0.0488	0.0486	0.0431
							0.0101	0.0288	0.0370	0.0347	0.0360	0.0362	0.0391
								-0.0610	-0.1305	-0.1319	-0.1342	-0.1339	-0.1364
									0.2261	0.2366	0.2350	0.2345	0.2302
										-0.0328	-0.0215	-0.0218	-0.0138
											-0.0345	-0.0322	-0.0278
												-0.0071	-0.0443
													0.1137

Tabel Matrix Ordo 15 x 15

1.00	0.29	0.04	-0.05	0.00	0.03	0.02	0.04	0.03	-0.04	0.17	0.09	0.00	-0.04	0.08
0.29	1.00	0.29	0.04	-0.05	0.00	0.03	0.02	0.04	0.03	-0.04	0.17	0.09	0.00	-0.04
0.04	0.29	1.00	0.29	0.04	-0.05	0.00	0.03	0.02	0.04	0.03	-0.04	0.17	0.09	0.00
-0.05	0.04	0.29	1.00	0.29	0.04	-0.05	0.00	0.03	0.02	0.04	0.03	-0.04	0.17	0.09
0.00	-0.05	0.04	0.29	1.00	0.29	0.04	-0.05	0.00	0.03	0.02	0.04	0.03	-0.04	0.17
0.03	0.00	-0.05	0.04	0.29	1.00	0.29	0.04	-0.05	0.00	0.03	0.02	0.04	0.03	-0.04
0.02	0.03	0.00	-0.05	0.04	0.29	1.00	0.29	0.04	-0.05	0.00	0.03	0.02	0.04	0.03
0.04	0.02	0.03	0.00	-0.05	0.04	0.29	1.00	0.29	0.04	-0.05	0.00	0.03	0.02	0.04

0.03	0.04	0.02	0.03	0.00	-0.05	0.04	0.29	1.00	0.29	0.04	-0.05	0.00	0.03	0.02
-0.04	0.03	0.04	0.02	0.03	0.00	-0.05	0.04	0.29	1.00	0.29	0.04	-0.05	0.00	0.03
0.17	-0.04	0.03	0.04	0.02	0.03	0.00	-0.05	0.04	0.29	1.00	0.29	0.04	-0.05	0.00
0.09	0.17	-0.04	0.03	0.04	0.02	0.03	0.00	-0.05	0.04	0.29	1.00	0.29	0.04	-0.05
0.00	0.09	0.17	-0.04	0.03	0.04	0.02	0.03	0.00	-0.05	0.04	0.29	1.00	0.29	0.04
-0.04	0.00	0.09	0.17	-0.04	0.03	0.04	0.02	0.03	0.00	-0.05	0.04	0.29	1.00	0.29
0.08	-0.04	0.00	0.09	0.17	-0.04	0.03	0.04	0.02	0.03	0.00	-0.05	0.04	0.29	1.00

ACF	X-Squared	h	p-value
1			
0.292449	20.69848366	1	0.0000
0.035201	0.299873916	2	0.860762
-0.04926	0.587275553	3	0.899339
0.00084	0.000170637	4	1

b. Dengan Bantuan R-Studio 4.4.2

Box-Ljung test

data: (sisaan.da)^2
X-squared = 20.698, df = 1, p-value = 5.376e-06

Kesimpulan:

Berdasarkan hasil uji homoskedastisitas terhadap residual model ARIMA(2,1,4), diperoleh nilai statistik *Chi-kuadrat* (X^2) sebesar 20.698 dengan *p-value* sebesar 0.0000. Karena *p-value* < 0.05 , maka keputusan uji adalah menolak H_0 . Dengan demikian, dapat disimpulkan bahwa residual model tidak bersifat homoskedastis, atau dengan kata lain, terdapat gejala heteroskedastisitas dalam residual.



Lampiran 58 Riwayat Hidup Penulis



Putu Ngurah Harimbawa lahir di Singaraja pada tanggal 16 Maret 2004, dari pasangan Bapak Gede Mustika dan Ibu Komang Widiani. Penulis berkewarganegaraan Indonesia dan beragama Hindu. Saat ini penulis berdomisili di Jalan Prawira Dharma, Dusun Dharma Yasa, Gang Dahlia No. 8, Desa Tukadmungga, Kecamatan Buleleng, Kabupaten Buleleng, Provinsi Bali. Penulis menempuh pendidikan dasar di SD Negeri 3 Tukadmungga dan lulus pada tahun 2016. Pendidikan menengah pertama ditempuh di SMP Dharmakerti dan lulus pada tahun 2019. Selanjutnya, pada tahun 2022 penulis lulus dari SMA Negeri 2 Singaraja dengan jurusan MIPA. Setelah itu, penulis melanjutkan studi ke Program Studi S1 Matematika Universitas Pendidikan Ganesha pada tahun 2022 dan masih berstatus sebagai mahasiswa hingga penulisan skripsi ini. Dalam kegiatan organisasi, penulis pernah menjadi pengurus HMJ Matematika masa bakti 2022/2023, 2023/2024, dan 2024/2025 sebagai anggota Sie Futsal dan Sepakbola. Selain itu, penulis juga aktif sebagai pengurus BEM FMIPA masa bakti 2024/2025 dengan jabatan Koordinator Sie Futsal dan Sepakbola. Penulis juga mengikuti program MBKM dengan menjadi ketua Program Penguatan Kapasitas Organisasi Kemahasiswaan (PPK Ormawa) BEM FMIPA Undiksha tahun 2024.