Modul 5 – Uji Asumsi Klasik

Pertemuan 11 (4 x 1 SKS tutorial = 4 x 170 menit praktikum)

Judul Modul 3	Uji Normalitas dan Regresi Linier

Uji Asumsi klasik

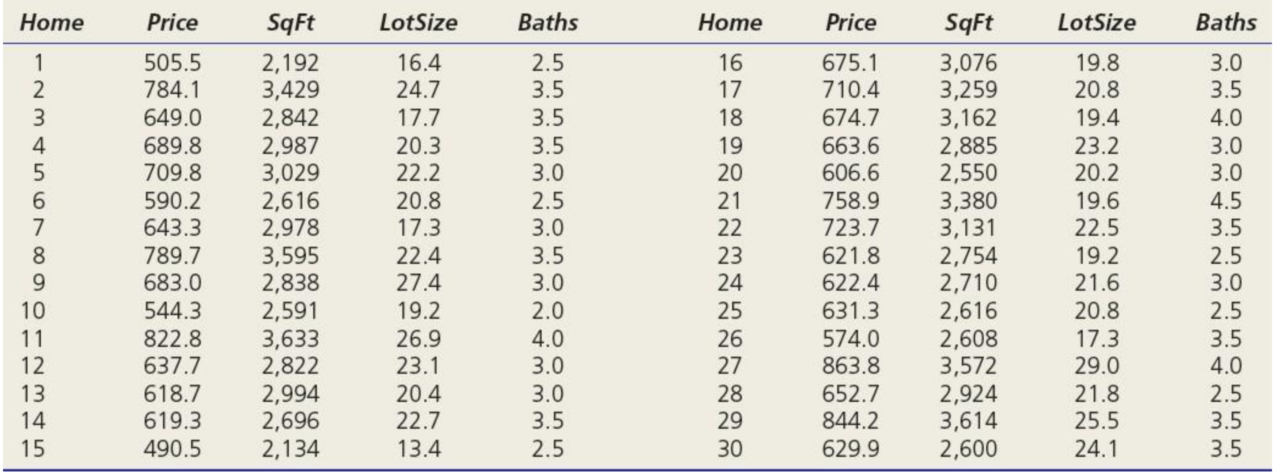
1. Uji Heteroskedastisitas bertujuan untuk memiliki varians yang konstan
2. Uji Multikolinearitas bertujuan untuk menguji apakah ada hubungan atau pengaruh antar sesame variable bebas.
3. Uji Autokorelasi bertujuan untuk menguji apakah dalam suatu model regresi linear ada korelasi antara kesalahan pengganggu pada periode t dengan kesalahan pada periode t-1 (sebelumnya).

Soal 1

Berikut tersedia data 30 rumah beserta harga jualnya yang ditentukan sejumlah variabel bebas. Berikut penjelasan variabel

Definisi variabel

- Y = harga jual rumah (ribuan dolar) – *Price*
- X1 = Ukuran rumah (meter persegi) – *SqFt*
- X2 = Luas rumah (ribuan meter persegi) – *LotSize*
- X3 = Jumlah kamar mandi – *Baths*

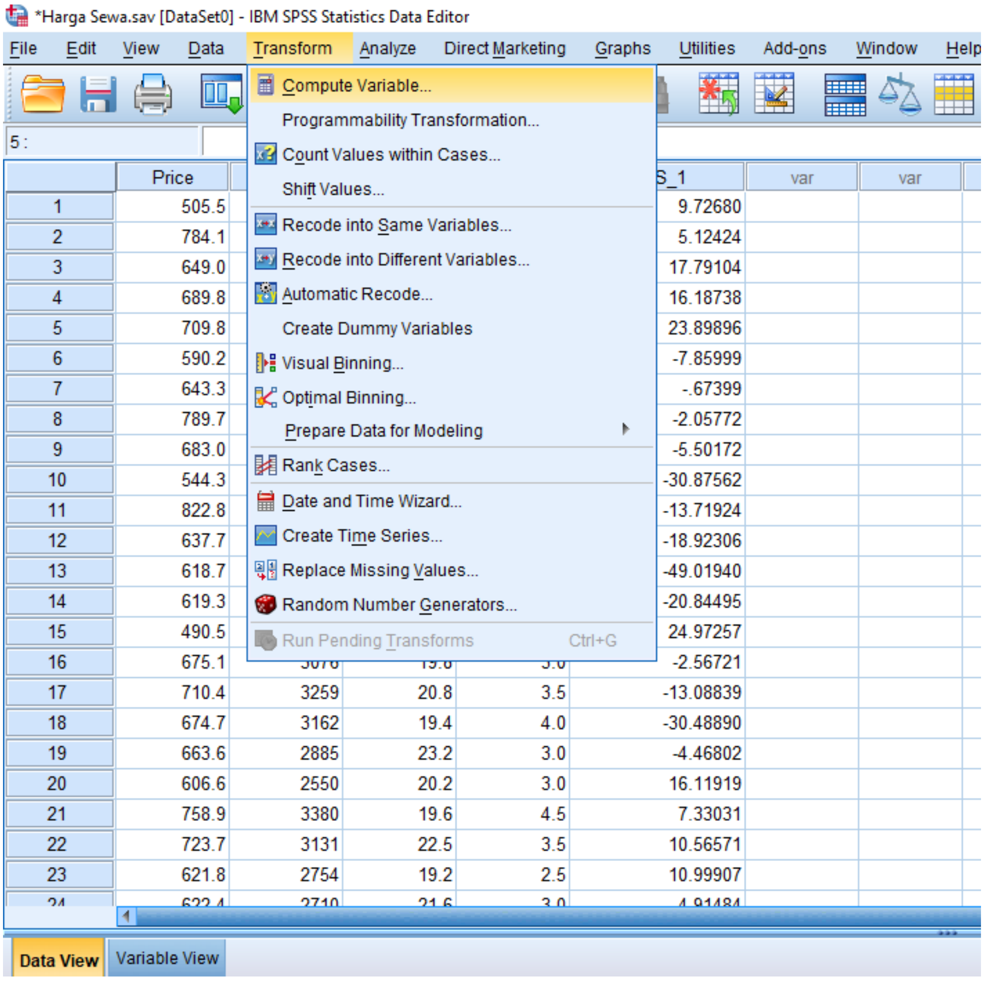


Home	*Price*	*SqFt*	*LotSize*	*Baths*	*Home*	*Price*	*SqFt*	*LotSize*	*Baths*
1	505.5	2,192	16.4	2.5	16	675.1	3,076	19.8	3.0
2	784.1	3,429	24.7	3.5	17	710.4	3,259	20.8	3.5
3	649.0	2,842	17.7	3.5	18	674.7	3,162	19.4	4.0
4	689.8	2,987	20.3	3.5	19	663.6	2,885	23.2	3.0
5	709.8	3,029	22.2	3.0	20	606.6	2,550	20.2	3.0
6	590.2	2,616	20.8	2.5	21	758.9	3,380	19.6	4.5
7	643.3	2,978	17.3	3.0	22	723.7	3,131	22.5	3.5
8	789.7	3,595	22.4	3.5	23	621.8	2,754	19.2	2.5
9	683.0	2,838	27.4	3.0	24	622.4	2,710	21.6	3.0
10	544.3	2,591	19.2	2.0	25	631.3	2,616	20.8	2.5
11	822.8	3,633	26.9	4.0	26	574.0	2,608	17.3	3.5
12	637.7	2,822	23.1	3.0	27	863.8	3,572	29.0	4.0
13	618.7	2,994	20.4	3.0	28	652.7	2,924	21.8	2.5
14	619.3	2,696	22.7	3.5	29	844.2	3,614	25.5	3.5
15	490.5	2,134	13.4	2.5	30	629.9	2,600	24.1	3.5

1. Uji apakah data terkena masalah heteroskedastisitas?
2. Uji apakah data terkena masalah multikoliearitas?
3. Uji apakah data terkena masalah autokorelasi?

Penyelesaian

1. **Asumsi 1:** error memiliki varians yang konstan (misalnya, *error* harus homoskedastisitas). Uji yang digunakan untuk praktik adalah Uji Glejser.
    1. Transformasi data residual, dengan klik pada transform lalu computer variable.


*Harga Sewa.sav [DataSet0] - IBM SPSS Statistics Data Editor
File
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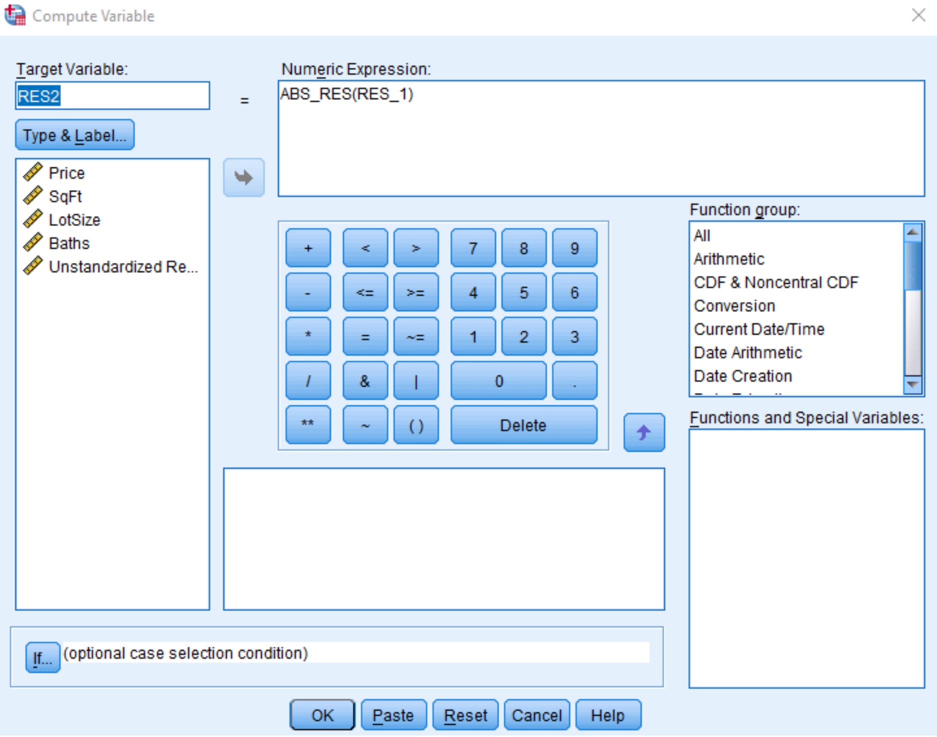
5 :
Compute Variable...
Programmability Transformation...
Count Values within Cases...
Shift Values...
Recode into Same Variables...
Recode into Different Variables...
Automatic Recode...
Create Dummy Variables
Visual Binning...
Optimal Binning...
Prepare Data for Modeling
Rank Cases...
Date and Time Wizard...
Create Time Series...
Replace Missing Values...
Random Number Generators...
Run Pending Transforms
Ctrl+G
var
var
Data View
Variable View

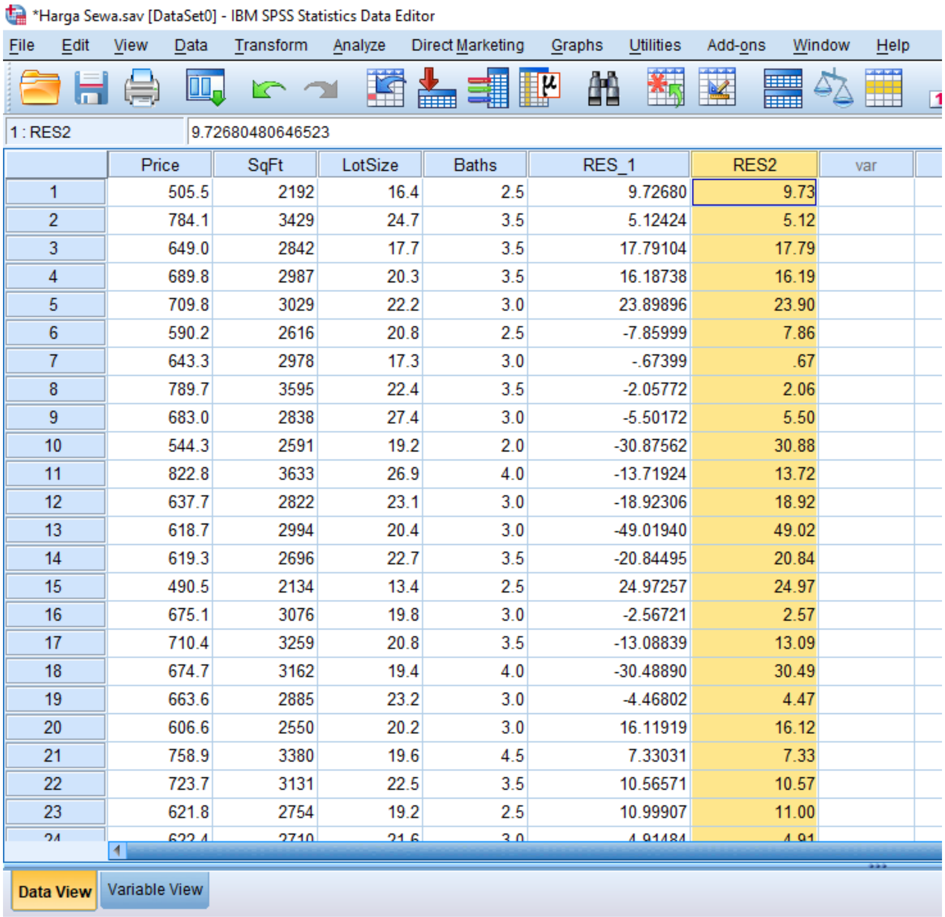
	Price				S_1
1	505.5				9.72680
2	784.1				5.12424
3	649.0				17.79104
4	689.8				16.18738
5	709.8				23.89896
6	590.2				-7.85999
7	643.3				-.67399
8	789.7				-2.05772
9	683.0				-5.50172
10	544.3				-30.87562
11	822.8				-13.71924
12	637.7				-18.92306
13	618.7				-49.01940
14	619.3				-20.84495
15	490.5				24.97257
16	675.1				-2.56721
17	710.4	3259	20.8	3.5	-13.08839
18	674.7	3162	19.4	4.0	-30.48890
19	663.6	2885	23.2	3.0	-4.46802
20	606.6	2550	20.2	3.0	16.11919
21	758.9	3380	19.6	4.5	7.33031
22	723.7	3131	22.5	3.5	10.56571
23	621.8	2754	19.2	2.5	10.99907

2. Setelah itu muncul kotak dialog computer variable dan pada target variable RES2 dan numeric expression ketik rumus ABS-RES(RES_1) bertujuan untuk menghilangkan nilai negatif. Lalu klik ok dan abaikan outputnya.


Compute Variable
Type & Label...
Price
SqFt
LotSize
Baths
Unstandardized Re...
+
<
>
7
8
9
-
<=
>=
4
5
6
*
=
~=
1
2
3
/
&
|
0
.
**
~
()
Delete
Function group:
All
Arithmetic
CDF & Noncentral CDF
Conversion
Current Date/Time
Date Arithmetic
Date Creation
Functions and Special Variables:
If...
(optional case selection condition)
OK
Paste
Reset
Cancel
Help

Target Variable: RES2 = Numeric Expression: ABS_RES(RES_1)

3. Hasilnya muncul RES2 pada kolom yang baru.


*Harga Sewa.sav [DataSet0] - IBM SPSS Statistics Data Editor
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Data View
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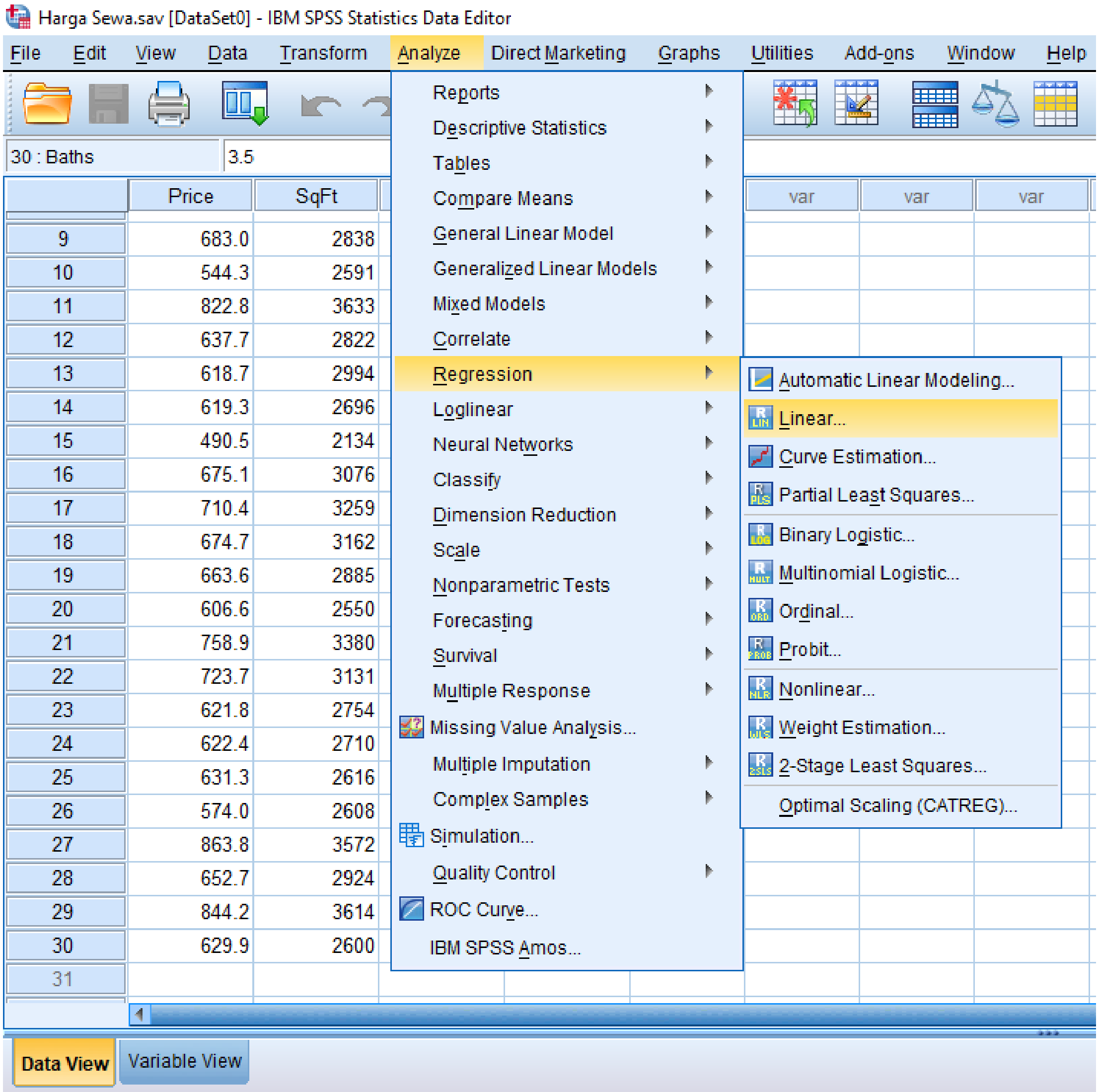
1 : RES2 9.72680480646523

	Price	SqFt	LotSize	Baths	RES_1	RES2	var
1	505.5	2192	16.4	2.5	9.72680	9.73	
2	784.1	3429	24.7	3.5	5.12424	5.12	
3	649.0	2842	17.7	3.5	17.79104	17.79	
4	689.8	2987	20.3	3.5	16.18738	16.19	
5	709.8	3029	22.2	3.0	23.89896	23.90	
6	590.2	2616	20.8	2.5	-7.85999	7.86	
7	643.3	2978	17.3	3.0	-.67399	.67	
8	789.7	3595	22.4	3.5	-2.05772	2.06	
9	683.0	2838	27.4	3.0	-5.50172	5.50	
10	544.3	2591	19.2	2.0	-30.87562	30.88	
11	822.8	3633	26.9	4.0	-13.71924	13.72	
12	637.7	2822	23.1	3.0	-18.92306	18.92	
13	618.7	2994	20.4	3.0	-49.01940	49.02	
14	619.3	2696	22.7	3.5	-20.84495	20.84	
15	490.5	2134	13.4	2.5	24.97257	24.97	
16	675.1	3076	19.8	3.0	-2.56721	2.57	
17	710.4	3259	20.8	3.5	-13.08839	13.09	
18	674.7	3162	19.4	4.0	-30.48890	30.49	
19	663.6	2885	23.2	3.0	-4.46802	4.47	
20	606.6	2550	20.2	3.0	16.11919	16.12	
21	758.9	3380	19.6	4.5	7.33031	7.33	
22	723.7	3131	22.5	3.5	10.56571	10.57	
23	621.8	2754	19.2	2.5	10.99907	11.00	

4. Lakukan langkap seperti menguji regresi, Klik analyze lalu pilih regression, lalu klik linier.


Harga Sewa.sav [DataSet0] - IBM SPSS Statistics Data Editor
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Window
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30 : Baths
3.5
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Generalized Linear Models
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Dimension Reduction
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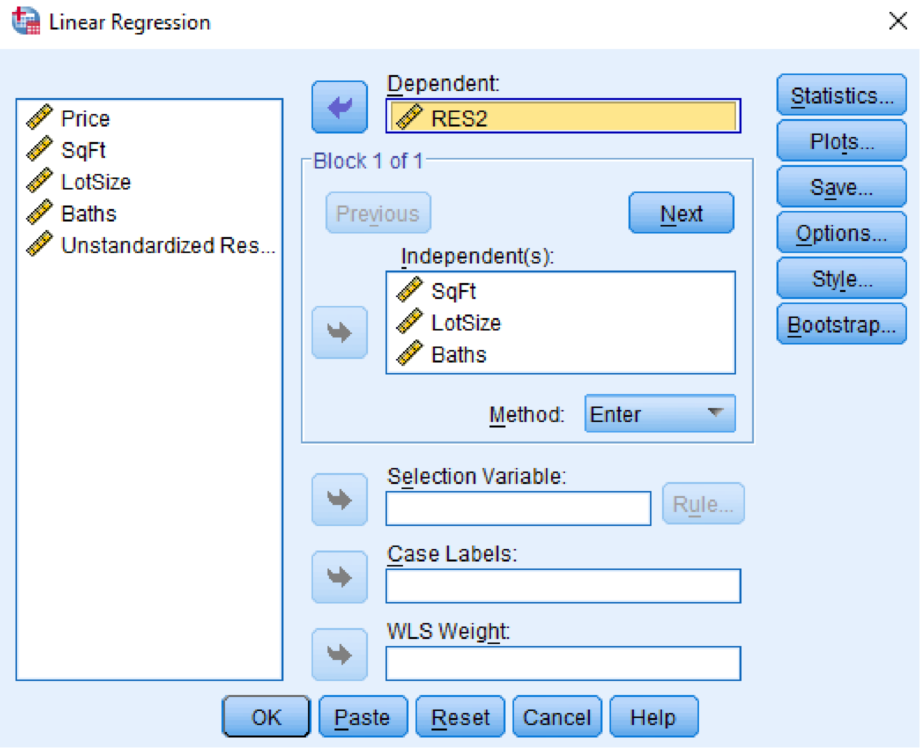
Nonparametric Tests
Forecasting
Survival
Multiple Response
Missing Value Analysis...
Multiple Imputation
Complex Samples
Simulation...
Quality Control
ROC Curve...
IBM SPSS Amos...
Automatic Linear Modeling...
Linear...
Curve Estimation...
Partial Least Squares...
Binary Logistic...
Multinomial Logistic...
Ordinal...
Probit...
Nonlinear...
Weight Estimation...
2-Stage Least Squares...
Optimal Scaling (CATREG)...
var
var
var
Data View
Variable View

	Price	SqFt
9	683.0	2838
10	544.3	2591
11	822.8	3633
12	637.7	2822
13	618.7	2994
14	619.3	2696
15	490.5	2134
16	675.1	3076
17	710.4	3259
18	674.7	3162
19	663.6	2885
20	606.6	2550
21	758.9	3380
22	723.7	3131
23	621.8	2754
24	622.4	2710
25	631.3	2616
26	574.0	2608
27	863.8	3572
28	652.7	2924
29	844.2	3614
30	629.9	2600
31		

5. Setelah itu muncul kotak dialog berikut dan masukan RES2 pada bagian dependent dan tiga variabel bebas yang akan diuji pada bagian independent(s). klik save untuk menghilangkan tanda centang (✓) pada unstandardized.

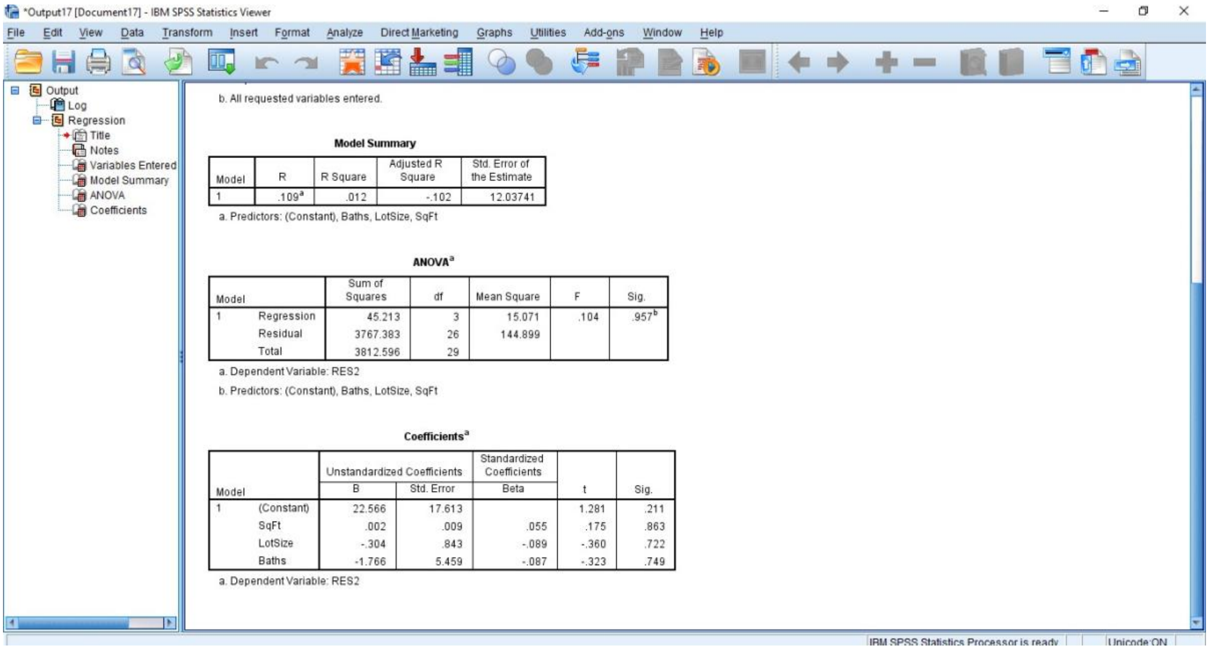

Linear Regression
Price
SqFt
LotSize
Baths
Unstandardized Res...
Block 1 of 1
Previous
Next
Selection Variable:
Rule...
Case Labels:
WLS Weight:
Statistics...
Plots...
Save...
Options...
Style...
Bootstrap...
OK
Paste
Reset
Cancel
Help

Dependent: RES2

Independent(s): SqFt, LotSize, Baths

Method: Enter

6. Hasilnya sebagai berikut.


*Output17 [Document17] - IBM SPSS Statistics Viewer
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Output
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Regression
Title
Notes
Variables Entered
Model Summary
ANOVA
Coefficients
IBM SPSS Statistics Processor is ready
Unicode:ON

b. All requested variables entered.

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.109^a	.012	-.102	12.03741

a. Predictors: (Constant), Baths, LotSize, SqFt

ANOVA^a

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	45.213	3	15.071	.104	.957^b
	Residual	3767.383	26	144.899		
	Total	3812.596	29			

a. Dependent Variable: RES2

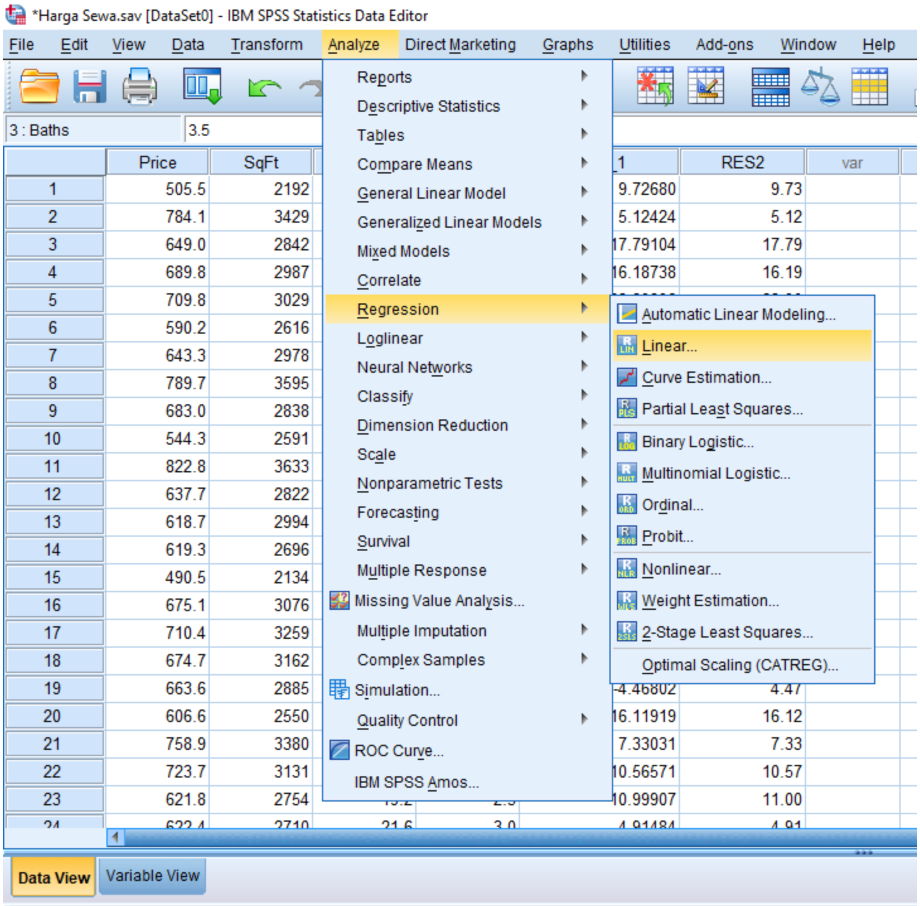
b. Predictors: (Constant), Baths, LotSize, SqFt

Coefficients^a

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	22.566	17.613		1.281	.211
	SqFt	.002	.009	.055	.175	.863
	LotSize	-.304	.843	-.089	-.360	.722
	Baths	-1.766	5.459	-.087	-.323	.749

a. Dependent Variable: RES2

2. **Assumption 2**: sesama variabel bebas tidak boleh berhubungan.
   1. Lakukan seperti pengujian regresi. Kilik analyze pilih regression dan pilih linear.


*Harga Sewa.sav [DataSet0] - IBM SPSS Statistics Data Editor
File
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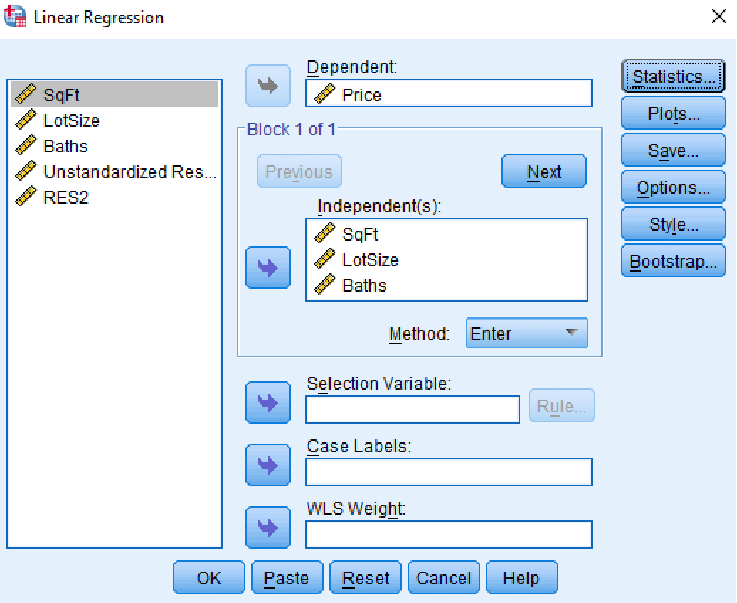
Window
Help
3 : Baths
3.5
Reports
Descriptive Statistics
Tables
Compare Means
General Linear Model
Generalized Linear Models
Mixed Models
Correlate
Regression
Loglinear
Neural Networks
Classify
Dimension Reduction
Scale
Nonparametric Tests
Forecasting
Survival
Multiple Response
Missing Value Analysis...
Multiple Imputation
Complex Samples
Simulation...
Quality Control
ROC Curve...
IBM SPSS Amos...
Automatic Linear Modeling...
Linear...
Curve Estimation...
Partial Least Squares...
Binary Logistic...
Multinomial Logistic...
Ordinal...
Probit...
Nonlinear...
Weight Estimation...
2-Stage Least Squares...
Optimal Scaling (CATREG)...
var
Data View
Variable View

	Price	SqFt	1	RES2
1	505.5	2192	9.72680	9.73
2	784.1	3429	5.12424	5.12
3	649.0	2842	17.79104	17.79
4	689.8	2987	16.18738	16.19
5	709.8	3029		
6	590.2	2616		
7	643.3	2978		
8	789.7	3595		
9	683.0	2838		
10	544.3	2591		
11	822.8	3633		
12	637.7	2822		
13	618.7	2994		
14	619.3	2696		
15	490.5	2134		
16	675.1	3076		
17	710.4	3259		
18	674.7	3162		
19	663.6	2885	-4.46802	4.47
20	606.6	2550	16.11919	16.12
21	758.9	3380	7.33031	7.33
22	723.7	3131	10.56571	10.57
23	621.8	2754	10.99907	11.00

2. Setelah muncul kotak dialog, masukan kembali price ke bagian dependen dan tiga variabel bebas lainnya ke bagian independent(s). lalu klik statistics.

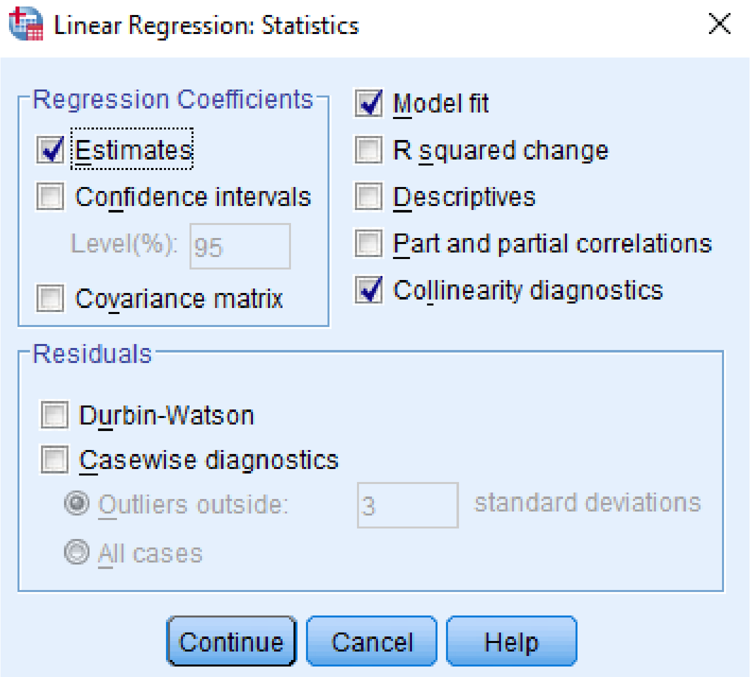

Linear Regression
SqFt
LotSize
Baths
Unstandardized Res...
RES2
Block 1 of 1
Previous
Next
Selection Variable:
Rule...
Case Labels:
WLS Weight:
Statistics...
Plots...
Save...
Options...
Style...
Bootstrap...
OK
Paste
Reset
Cancel
Help

Dependent: Price

Independent(s): SqFt, LotSize, Baths

Method: Enter

3. Pastikan tanda centang (✓) pada collinearity diagnostics.

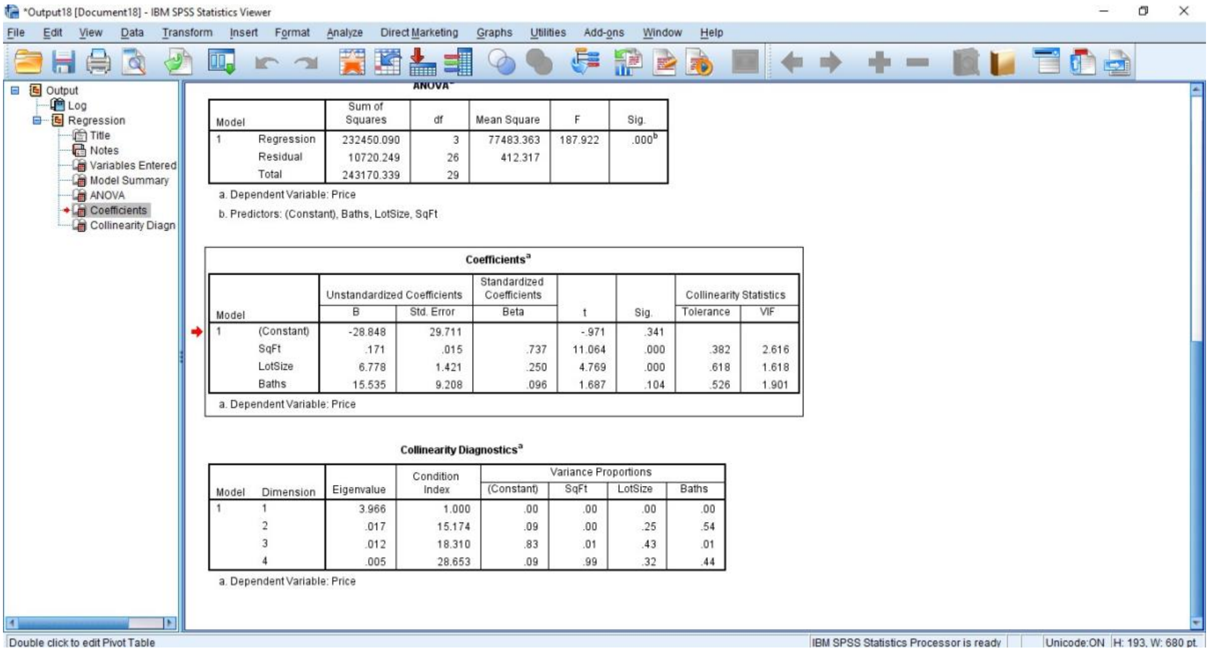

Linear Regression: Statistics
Continue
Cancel
Help

Regression Coefficients
☑ Estimates
☐ Confidence intervals
Level(%): 95
☐ Covariance matrix

☑ Model fit
☐ R squared change
☐ Descriptives
☐ Part and partial correlations
☑ Collinearity diagnostics

Residuals
☐ Durbin-Watson
☐ Casewise diagnostics
● Outliers outside: 3 standard deviations
○ All cases

4. Hasilnya terlihat pada VIF.


*Output18 [Document18] - IBM SPSS Statistics Viewer
File Edit View Data Transform Insert Format Analyze Direct Marketing Graphs Utilities Add-ons Window Help
Output
Log
Regression
Title
Notes
Variables Entered
Model Summary
ANOVA
Coefficients
Collinearity Diagn
Double click to edit Pivot Table
IBM SPSS Statistics Processor is ready
Unicode:ON
H: 193, W: 680 pt

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	232450.090	3	77483.363	187.922	.000[b]
	Residual	10720.249	26	412.317		
	Total	243170.339	29			

a. Dependent Variable: Price

b. Predictors: (Constant), Baths, LotSize, SqFt

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	-28.848	29.711		-.971	.341		
	SqFt	.171	.015	.737	11.064	.000	.382	2.616
	LotSize	6.778	1.421	.250	4.769	.000	.618	1.618
	Baths	15.535	9.208	.096	1.687	.104	.526	1.901

a. Dependent Variable: Price

Collinearity Diagnostics[a]

Model	Dimension	Eigenvalue	Condition Index	Variance Proportions			
				(Constant)	SqFt	LotSize	Baths
1	1	3.966	1.000	.00	.00	.00	.00
	2	.017	15.174	.09	.00	.25	.54
	3	.012	18.310	.83	.01	.43	.01
	4	.005	28.653	.09	.99	.32	.44

a. Dependent Variable: Price

Soal 2

Berdasarkan pada teori penawaran, maka dapat diduga adanya pengaruh antara produksi dengan harga. Apabila harga meningkat, maka produksi meningkat pula. Jadi hubungan antara produksi dan harga adalah positif. Buktikan bahwa hal tersebut benar dengan menggunakan data produksi dan harga minyak kelapa sawit di Indonesia dari tahun 1991 sampai tahun 2002 berikut ini.

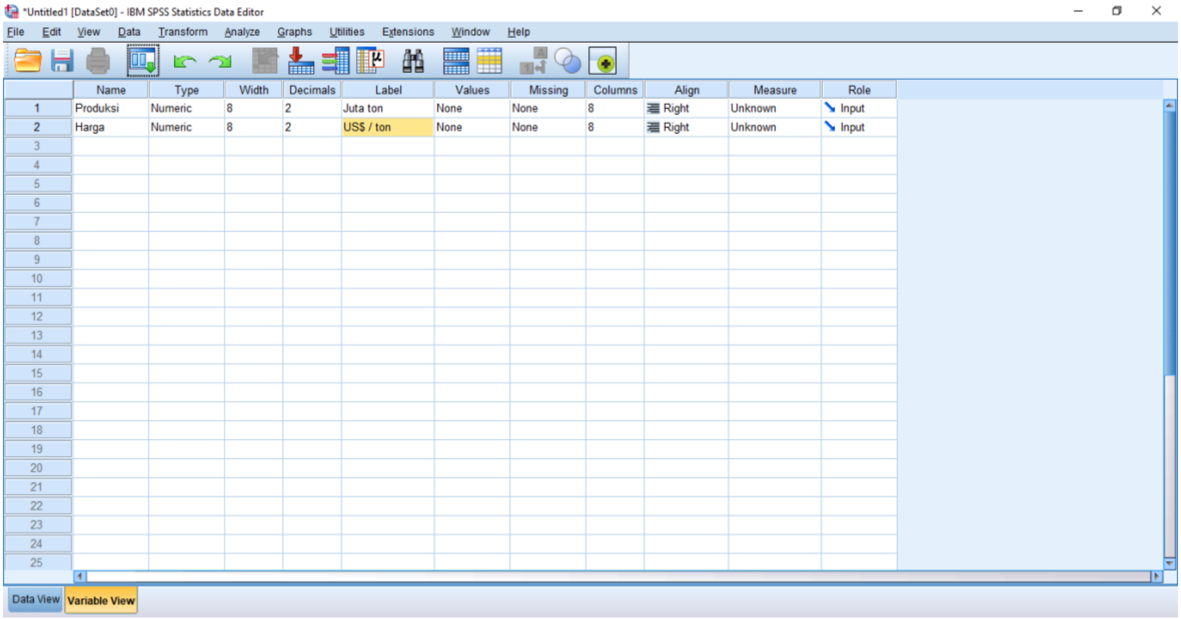
Tahun	Produksi (juta ton)	Harga (US$/ton)
1991	4,54	271
1992	4,53	319
1993	5,03	411

1994	6,05	348
1995	6,09	287
1996	6,14	330
1997	6,37	383
1998	7,40	384
1999	7,22	472
2000	7,81	610
2001	8,49	640

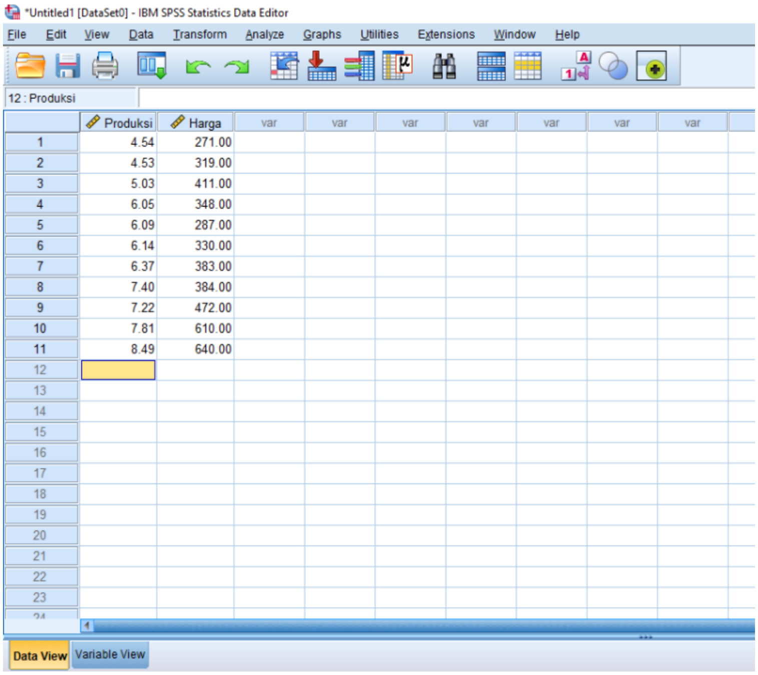
Uji autokorelasi terhadap data anda.

3. **Asumsi 3**: error tidak boleh berhubungan antar satu periode dengan periode berikunya. Pada program SPSS menggunakan Uji Durbin-Watson.

1. Input data pada aplikasi SPSS

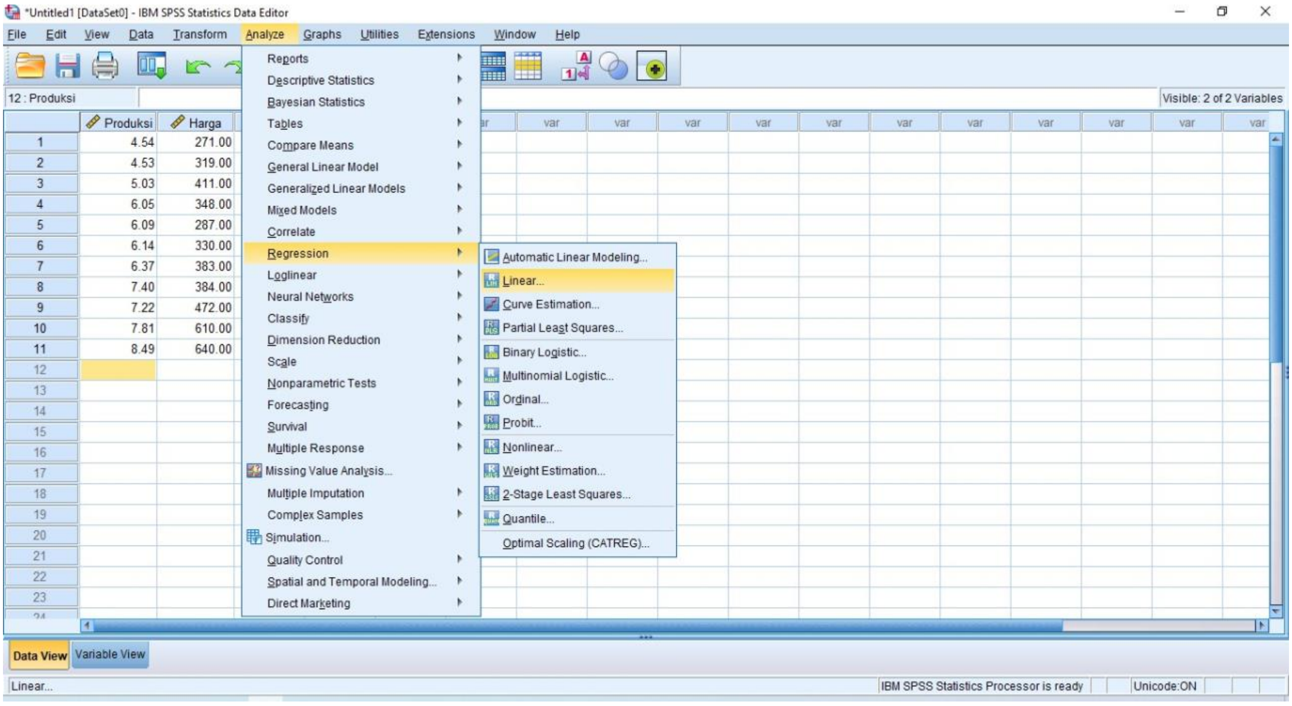

*Untitled1 [DataSet0] - IBM SPSS Statistics Data Editor
File
Edit
View
Data
Transform
Analyze
Graphs
Utilities
Extensions
Window
Help
Data View
Variable View

	Name	Type	Width	Decimals	Label	Values	Missing	Columns	Align	Measure	Role
1	Produksi	Numeric	8	2	Juta ton	None	None	8	Right	Unknown	Input
2	Harga	Numeric	8	2	US$ / ton	None	None	8	Right	Unknown	Input

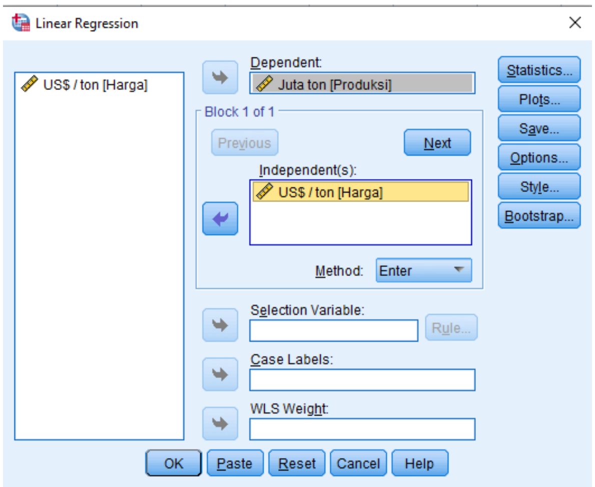

*Untitled1 [DataSet0] - IBM SPSS Statistics Data Editor
File Edit View Data Transform Analyze Graphs Utilities Extensions Window Help
12 : Produksi
Data View
Variable View

	Produksi	Harga
1	4.54	271.00
2	4.53	319.00
3	5.03	411.00
4	6.05	348.00
5	6.09	287.00
6	6.14	330.00
7	6.37	383.00
8	7.40	384.00
9	7.22	472.00
10	7.81	610.00
11	8.49	640.00

2. Lakukan pengujian regresi, dengan klik analyze, lalu pilih regression dan pilih linier.


*Untitled1 [DataSet0] - IBM SPSS Statistics Data Editor
File Edit View Data Transform Analyze Graphs Utilities Extensions Window Help
12 : Produksi
Visible: 2 of 2 Variables
Reports
Descriptive Statistics
Bayesian Statistics
Tables
Compare Means
General Linear Model
Generalized Linear Models
Mixed Models
Correlate
Regression
Loglinear
Neural Networks
Classify
Dimension Reduction
Scale
Nonparametric Tests
Forecasting
Survival
Multiple Response
Missing Value Analysis...
Multiple Imputation
Complex Samples
Simulation...
Quality Control
Spatial and Temporal Modeling...
Direct Marketing
Automatic Linear Modeling...
Linear...
Curve Estimation...
Partial Least Squares...
Binary Logistic...
Multinomial Logistic...
Ordinal...
Probit...
Nonlinear...
Weight Estimation...
2-Stage Least Squares...
Quantile...
Optimal Scaling (CATREG)...
Data View
Variable View
Linear...
IBM SPSS Statistics Processor is ready
Unicode:ON

3. Muncul kotak dialog linier regression, masukkan produksi pada bagian dependent dan harga pada bagian independent.



Linear Regression
Statistics...
Plots...
Save...
Options...
Style...
Bootstrap...
Block 1 of 1
Previous
Next
Rule...
OK
Paste
Reset
Cancel
Help

US$ / ton [Harga]

Dependent: Juta ton [Produksi]

Independent(s): US$ / ton [Harga]

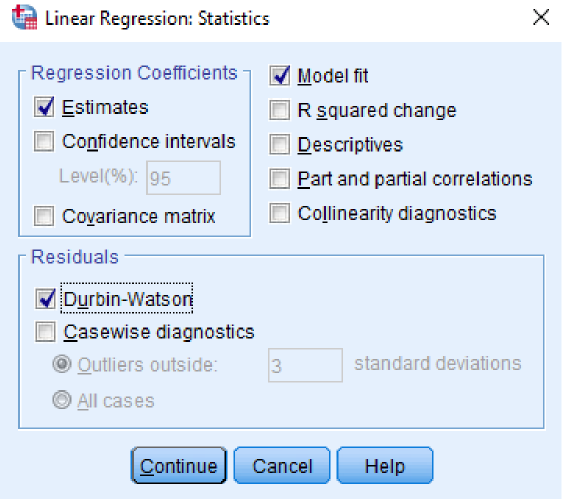
Method: Enter

Selection Variable:

Case Labels:

WLS Weight:

4. Setelah itu pilih statistics pada bagian kanan atas, lalu beri tanda centang (√) pada Durbin-Watson



Linear Regression: Statistics
Continue
Cancel
Help

Regression Coefficients

☑ Estimates

☐ Confidence intervals

Level(%): 95

☐ Covariance matrix

☑ Model fit

☐ R squared change

☐ Descriptives

☐ Part and partial correlations

☐ Collinearity diagnostics

Residuals

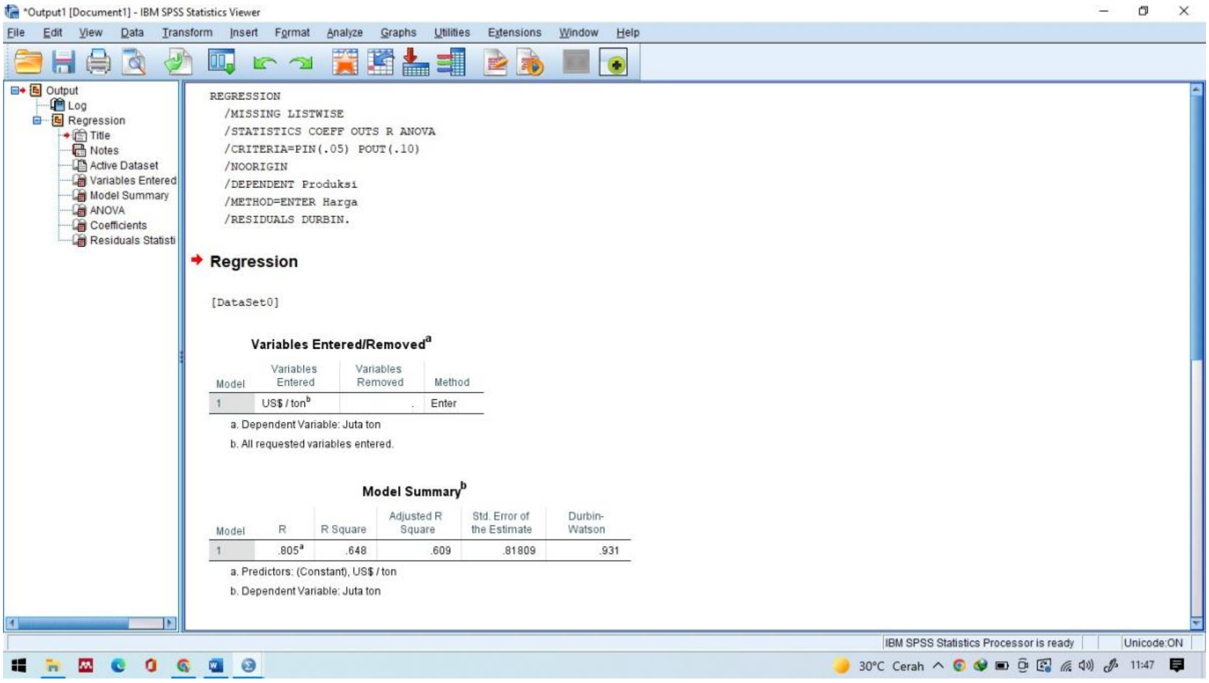
☑ Durbin-Watson

☐ Casewise diagnostics

● Outliers outside: 3 standard deviations

○ All cases

5. Lalu klik continue, lalu ok, akan muncul hasil atau *output*.



*Output1 [Document1] - IBM SPSS Statistics Viewer
File
Edit
View
Data
Transform
Insert
Format
Analyze
Graphs
Utilities
Extensions
Window
Help
Output
Log
Regression
Title
Notes
Active Dataset
Variables Entered
Model Summary
ANOVA
Coefficients
Residuals Statisti
IBM SPSS Statistics Processor is ready
Unicode:ON
30°C Cerah
11:47

```
REGRESSION
  /MISSING LISTWISE
  /STATISTICS COEFF OUTS R ANOVA
  /CRITERIA=PIN(.05) POUT(.10)
  /NOORIGIN
  /DEPENDENT Produksi
  /METHOD=ENTER Harga
  /RESIDUALS DURBIN.
```

Regression

```
[DataSet0]
```

Variables Entered/Removed[a]

Model	Variables Entered	Variables Removed	Method
1	US$ / ton[b]	.	Enter

a. Dependent Variable: Juta ton

b. All requested variables entered.

Model Summary[b]

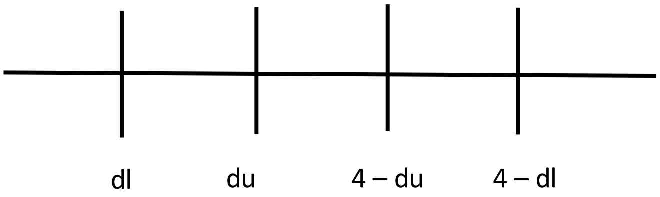
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.805[a]	.648	.609	.81809	.931

a. Predictors: (Constant), US$ / ton

b. Dependent Variable: Juta ton

6. Lihat hasil uji Durbin Watson pada tabel berjudul Model Summary.

Petunjuk Uji D-W


dl
du
4 – du
4 – dl