How can I perform logarithmic regression analysis using Excel?

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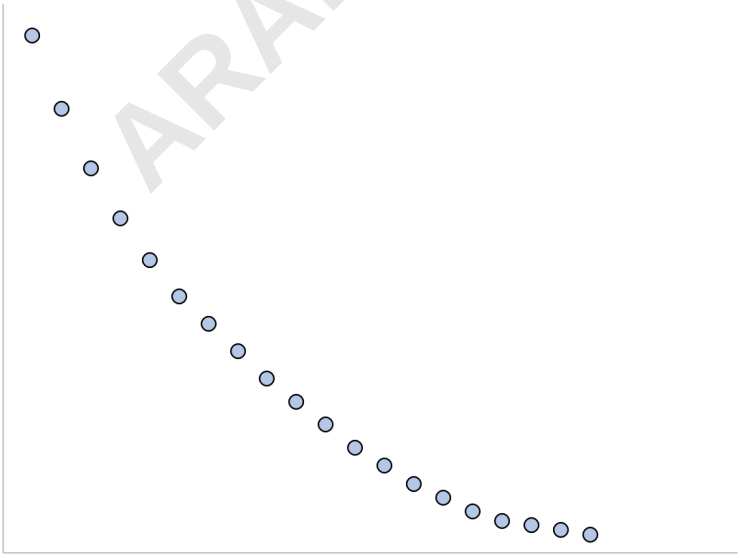
April 26, 2024

Logarithmic regression analysis is a statistical method used to model relationships between variables that follow a logarithmic pattern. This type of analysis is commonly used in fields such as economics, finance, and science. Excel offers a user-friendly and efficient way to perform logarithmic regression analysis. To do so, you will need to input your data into an Excel spreadsheet and use the built-in function "LOGEST" to calculate the regression coefficients. You can then plot the results using a scatter plot and use the trendline feature to display the logarithmic curve. This allows you to visually analyze the relationship between the variables and make predictions based on the regression model. Excel also provides tools for evaluating the accuracy and significance of the regression model, such as the R-squared value and p-value. Through these steps, Excel enables you to easily perform logarithmic regression analysis and gain valuable insights from your data.

Logarithmic Regression in Excel (Step-by-Step)

Logarithmic regression is a type of regression used to model situations where growth or decay accelerates rapidly at first and then slows over time.

For example, the following plot demonstrates an example of logarithmic decay:



For this type of situation, the relationship between a predictor variable and a response variable could be modeled well using logarithmic regression.

The equation of a logarithmic regression model takes the following form:

y = a + b*ln(x)

where:

y: The response variablex: The predictor variablea, b: The regression coefficients that describe the relationship between *x* and *y*

The following step-by-step example shows how to perform logarithmic regression in Excel.

Step 1: Create the Data

First, let's create some fake data for two variables: *x* and *y*:

	A	B	C	D	E	F
1	**x**	**y**				
2	1	59				
3	2	50				
4	3	44				
5	4	38				
6	5	33				
7	6	28				
8	7	23				
9	8	20				
10	9	17				
11	10	15				
12	11	13				
13	12	12				
14	13	11				
15	14	10				
16	15	9.5				
17						
18						
19						
20						
21						
22						
23						
24						

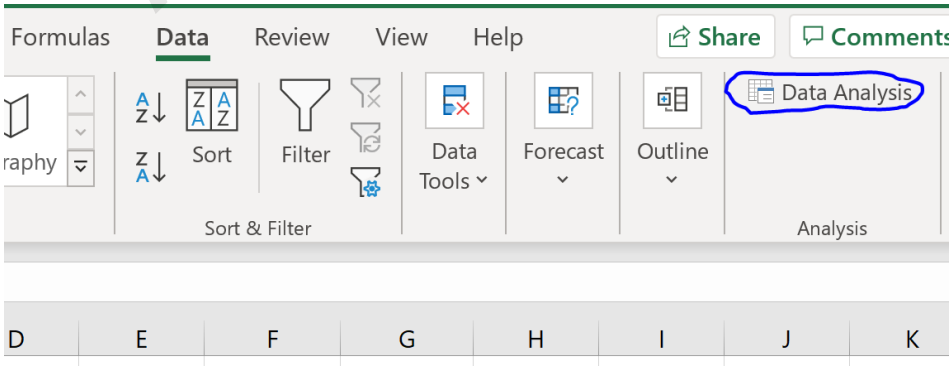
Step 2: Take the Natural Log of the Predictor Variable

Next, we need to create a new column that represents the natural log of the predictor variable *x*:

	A	B	C	D	E	F	G
1	**x**	**y**	**ln(x)**				
2	1	59	0	=LN(A2)			
3	2	50	0.693				
4	3	44	1.099				
5	4	38	1.386				
6	5	33	1.609				
7	6	28	1.792				
8	7	23	1.946				
9	8	20	2.079				
10	9	17	2.197				
11	10	15	2.303				
12	11	13	2.398				
13	12	12	2.485				
14	13	11	2.565				
15	14	10	2.639				
16	15	9.5	2.708				
17							
18							
19							
20							
21							
22							
23							
24							
25							

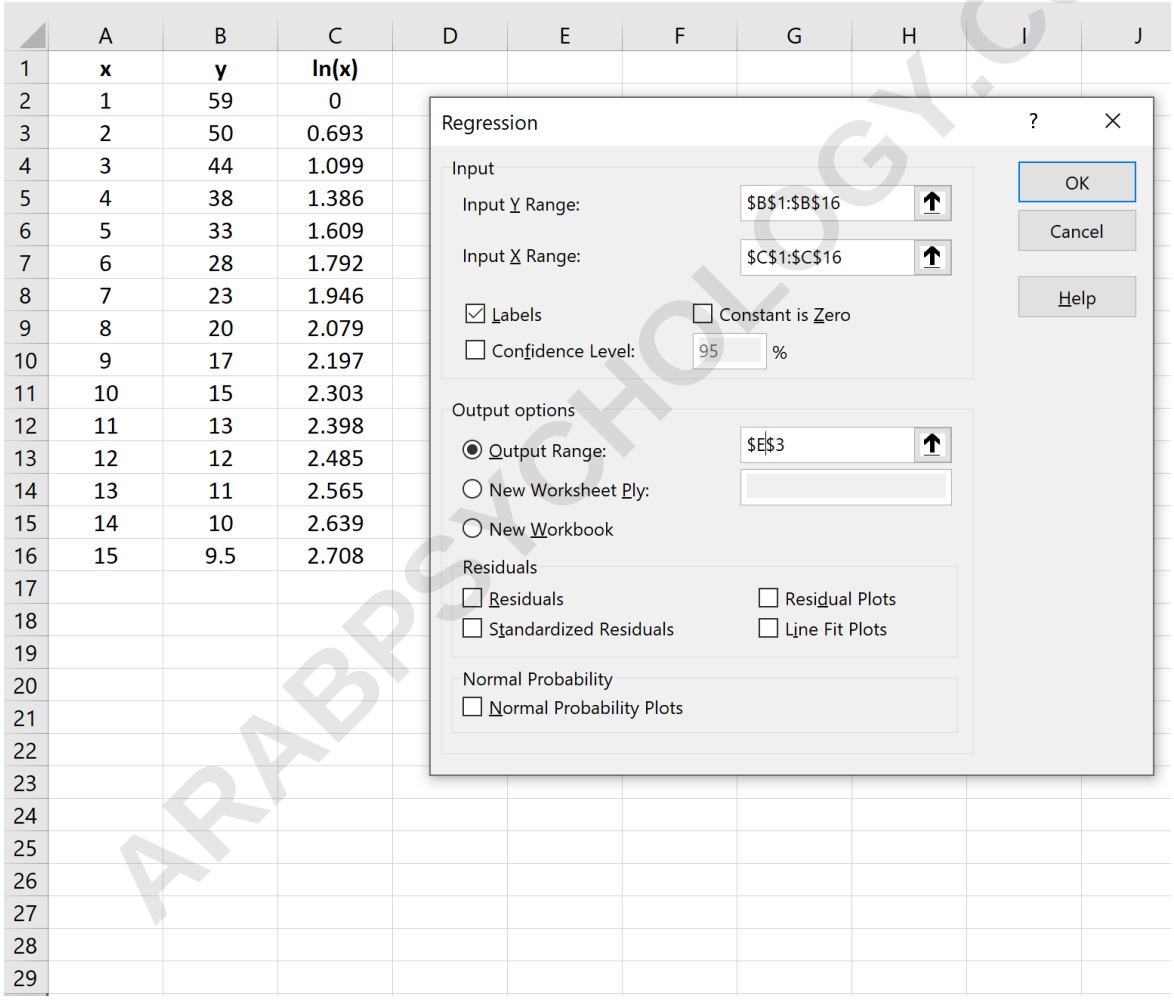
Step 3: Fit the Logarithmic Regression Model

Next, we'll fit the logarithmic regression model. To do so, click the Data tab along the top ribbon, then click Data Analysis within the Analysis group.



If you don't see Data Analysis as an option, you need to first .

In the window that pops up, click Regression. In the new window that pops up, fill in the following information:



	A	B	C
1	x	y	ln(x)
2	1	59	0
3	2	50	0.693
4	3	44	1.099
5	4	38	1.386
6	5	33	1.609
7	6	28	1.792
8	7	23	1.946
9	8	20	2.079
10	9	17	2.197
11	10	15	2.303
12	11	13	2.398
13	12	12	2.485
14	13	11	2.565
15	14	10	2.639
16	15	9.5	2.708

Once you click OK, the output of the logarithmic regression model will be shown:

E	F	G	H	I	J
SUMMARY OUTPUT					
Regression Statistics					
Multiple R	0.992242675				
R Square	0.984545526				
Adjusted R Square	0.98335672				
Standard Error	2.053603726				
Observations	15				
ANOVA					
	df	*SS*	*MS*	*F*	*Significance F*
Regression	1	3492.675253	3492.675	828.1803	3.70174E-13
Residual	13	54.82474741	4.217288		
Total	14	3547.5			
	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*
Intercept	63.06859979	1.409031708	44.76024	1.25E-15	60.02457185
ln(x)	-20.19869943	0.701876896	-28.7781	3.7E-13	-21.71501227

The of the model is 828.18 and the corresponding p-value is extremely small (3.70174E-13), which indicates that the model as a whole is useful.

Using the coefficients from the output table, we can see that the fitted logarithmic regression equation is:

y = 63.0686 - 20.1987 * ln(x)

We can use this equation to predict the response variable, *y*, based on the value of the predictor variable,

_x_. For example, if _x_ = 12, then we would predict that _y_ would be 12.87:

y = 63.0686 - 20.1987 * ln(12) = 12.87

Bonus: Feel free to use this online to automatically compute the logarithmic regression equation for a given predictor and response variable.

How to Perform Simple Linear Regression in Excel