

How can I perform exponential regression in Excel using a step-by-step method?

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RECOMMENDED CITATION

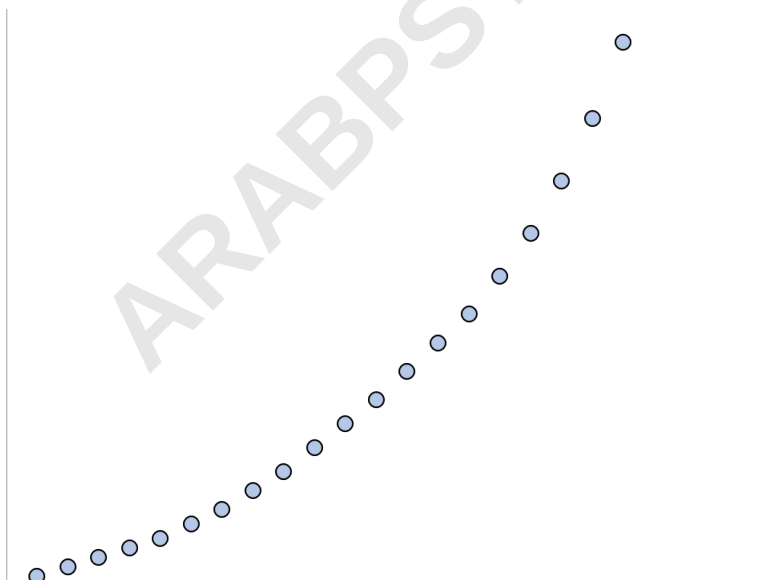
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Exponential regression is a statistical method used to model data that follows an exponential trend. This method can be easily performed in Excel using a step-by-step approach. First, organize the data into two columns, with the independent variable (x) in one column and the dependent variable (y) in the other. Next, select the data and go to the "Insert" tab, click on "Recommended Charts" and choose "Scatter with Smooth Lines and Markers." Then, right-click on one of the data points and select "Add Trendline." In the "Format Trendline" menu, choose "Exponential" as the type of trendline. Finally, check the boxes for "Display Equation on chart" and "Display R-squared value on chart" to see the equation and the goodness of fit of the model. This step-by-step method allows for easy and accurate performance of exponential regression in Excel.

Exponential Regression in Excel (Step-by-Step)

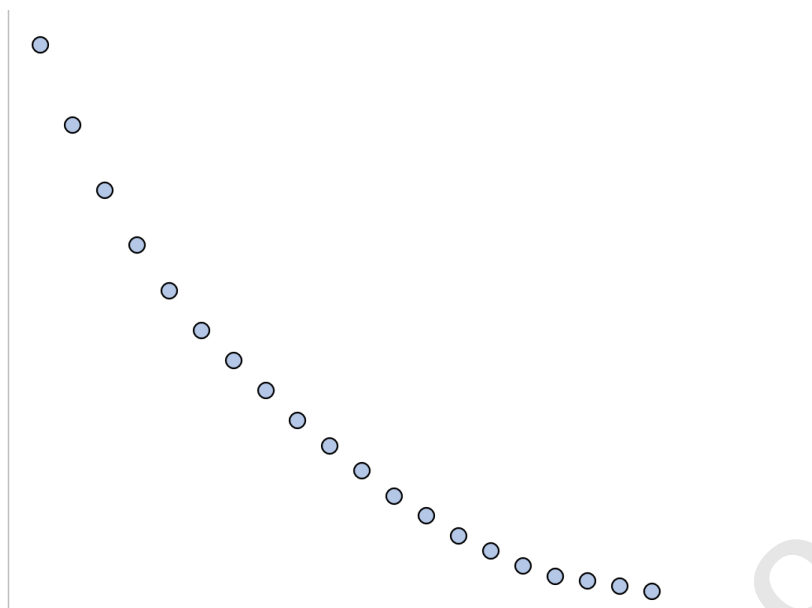
Exponential regression is a type of regression model that can be used to model the following situations:

1. Exponential growth: Growth begins slowly and then accelerates rapidly without bound.



2. Exponential decay: Decay begins rapidly and then

slows down to get closer and closer to zero.



The equation of an exponential regression model takes the following form:

$$y = ab^x$$

where:

y: The response variable
x: The predictor variable
a, b: The regression coefficients that describe the relationship between x and y

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

Step 1: Create the Data

First, let's create a fake dataset that contains 20 :

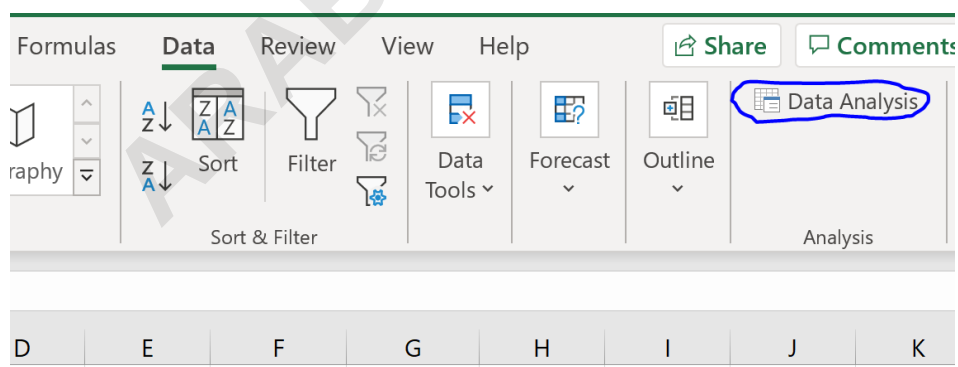
	A	B	C	D	E
1	x	y			
2	1	1			
3	2	3			
4	3	5			
5	4	7			
6	5	9			
7	6	12			
8	7	15			
9	8	19			
10	9	23			
11	10	28			
12	11	33			
13	12	38			
14	13	44			
15	14	50			
16	15	56			
17	16	64			
18	17	73			
19	18	84			
20	19	97			
21	20	113			
22					
23					
24					
25					

Step 2: Take the Natural Log of the Response Variable

Next, we need to create a new column that represents the natural log of the response variable y :

	A	B	C	D	E	F
1	x	y	ln(y)			
2	1	1	0	=LN(B2)		
3	2	3	1.098612			
4	3	5	1.609438			
5	4	7	1.94591			
6	5	9	2.197225			
7	6	12	2.484907			
8	7	15	2.70805			
9	8	19	2.944439			
10	9	23	3.135494			
11	10	28	3.332205			
12	11	33	3.496508			
13	12	38	3.637586			
14	13	44	3.78419			
15	14	50	3.912023			
16	15	56	4.025352			
17	16	64	4.158883			
18	17	73	4.290459			
19	18	84	4.430817			
20	19	97	4.574711			
21	20	113	4.727388			
22						
23						
24						
25						
26						
27						
28						

Step 3: Fit the Exponential Regression Model



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	D	E	F	G	H	I	J
1	x	y	ln(y)							
2	1	1	0							
3	2	3	1.098612							
4	3	5	1.609438							
5	4	7	1.94591							
6	5	9	2.197225							
7	6	12	2.484907							
8	7	15	2.70805							
9	8	19	2.944439							
10	9	23	3.135494							
11	10	28	3.332205							
12	11	33	3.496508							
13	12	38	3.637586							
14	13	44	3.78419							
15	14	50	3.912023							
16	15	56	4.025352							
17	16	64	4.158883							
18	17	73	4.290459							
19	18	84	4.430817							
20	19	97	4.574711							
21	20	113	4.727388							
22										
23										
24										
25										
26										
27										

Regression

Input

Input Y Range:

Input X Range:

☒ Labels ☐ Constant is Zero

☐ Confidence Level: %

Output options

☒ Output Range:

☐ New Worksheet Ply:

☐ New Workbook

Residuals

☐ Residuals ☐ Residual Plots

☐ Standardized Residuals ☐ Line Fit Plots

Normal Probability

☐ Normal Probability Plots

OK Cancel Help

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

E	F	G	H	I	J
SUMMARY OUTPUT					
<i>Regression Statistics</i>					
Multiple R	0.958604				
R Square	0.918921				
Adjusted R Square	0.914417				
Standard Error	0.368496				
Observations	20				
ANOVA					
	<i>df</i>	<i>SS</i>	<i>MS</i>	<i>F</i>	<i>Significance F</i>
Regression	1	27.70183194	27.70183	204.006	2.91682E-11
Residual	18	2.444207721	0.135789		
Total	19	30.14603966			
	<i>Coefficients</i>	<i>Standard Error</i>	<i>t Stat</i>	<i>P-value</i>	<i>Lower 95%</i>
Intercept	0.981658	0.171177993	5.734719	1.95E-05	0.622026102
x	0.2041	0.014289663	14.28307	2.92E-11	0.174078729

The F of the model is 204.006 and the corresponding p -value is extremely small, which indicates that the model as a whole is useful.

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

$$\ln(y) = 0.9817 + 0.2041(x)$$

Applying e to both sides, we can rewrite the equation as:

$$y = 2.6689 * 1.2264^x$$

We can use this equation to predict the response variable, y , based on the value of the predictor variable, x . For example, if $x = 14$, then we would predict that y would be 46.47:

$$y = 2.6689 * 1.2264^{14} = 46.47$$

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