What is the Standard Error of the Estimate? (Definition & Example)

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The Standard Error of the Estimate is a statistical measure that quantifies the accuracy of a regression line in predicting the values of a dependent variable based on an independent variable. It measures the average distance between the actual data points and the predicted values by the regression line. The lower the standard error of the estimate, the more accurate the regression line is in predicting the values. For example, if the standard error of the estimate is 2, it means that on average, the predicted values will be off by 2 units from the actual data points. This measure is commonly used in regression analysis to assess the reliability of the model and make informed decisions based on the predicted values.

What is the Standard Error of the Estimate? (Definition & Example)

The standard error of the estimate is a way to measure the accuracy of the predictions made by a regression model.

Often denoted σest, it is calculated as:

σest = √Σ(y - ?)2/n

where:

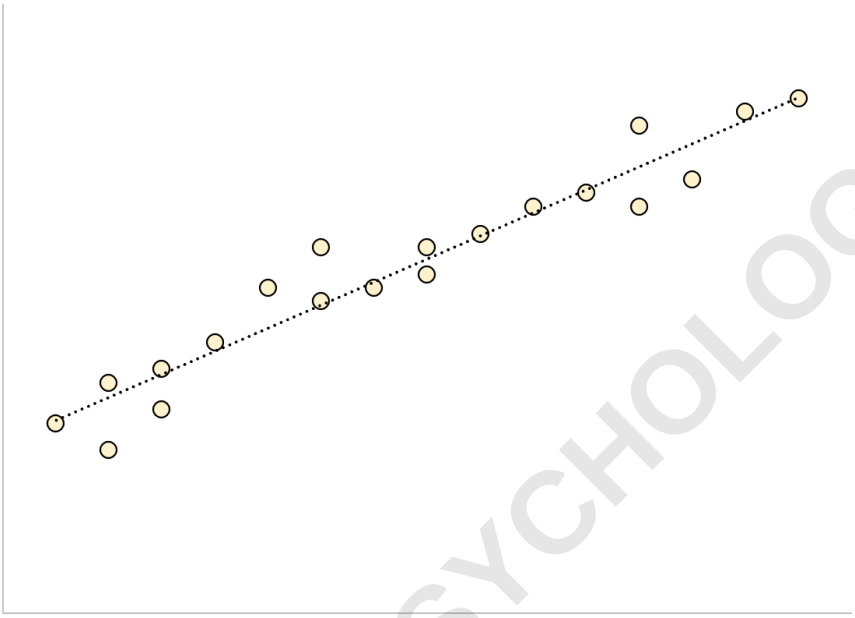
y: The observed value?: The predicted valuen: The total number of observations

The standard error of the estimate gives us an idea of how well a regression model fits a dataset. In particular:

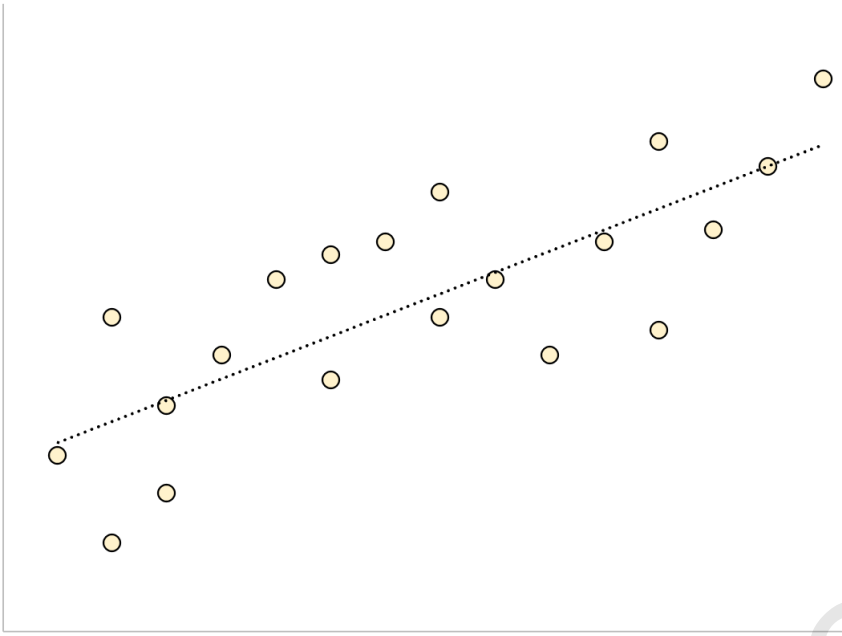
The smaller the value, the better the fit.The larger the

value, the worse the fit.

For a regression model that has a small standard error of the estimate, the data points will be closely packed around the estimated regression line:



Conversely, for a regression model that has a large standard error of the estimate, the data points will be more loosely scattered around the regression line:



The following example shows how to calculate and interpret the standard error of the estimate for a regression model in Excel.

Example: Standard Error of the Estimate in Excel

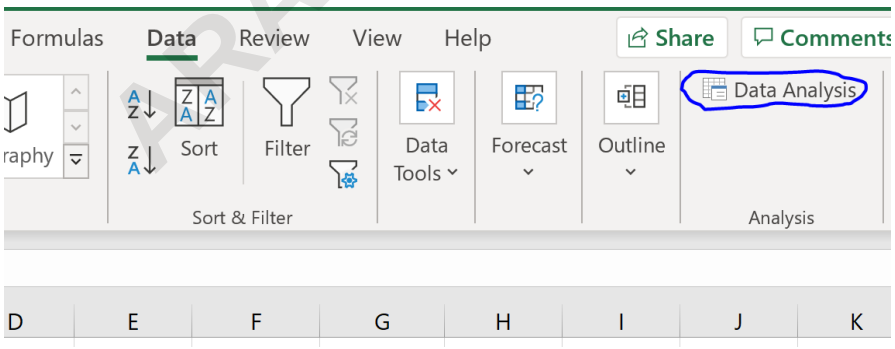
Use the following steps to calculate the standard error of the estimate for a regression model in Excel.

Step 1: Enter the Data

First, enter the values for the dataset:

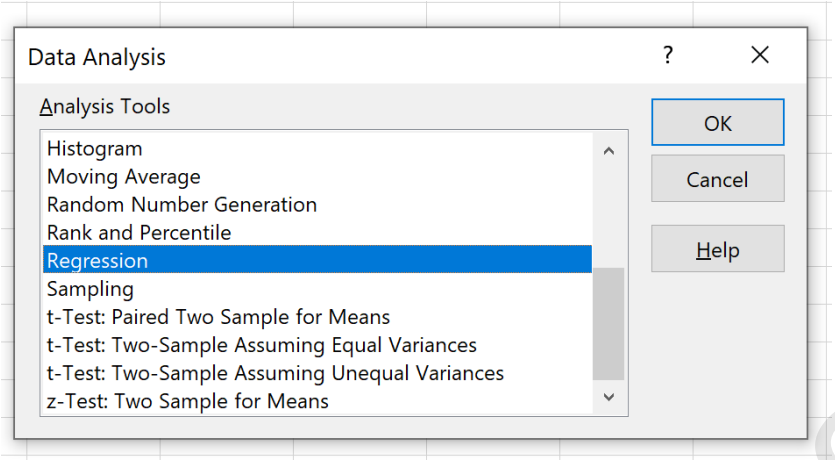
	A	B	C	D	E	F
1	**x**	**y**				
2	1	14				
3	2	7				
4	2	25				
5	3	18				
6	3	11				
7	4	22				
8	5	28				
9	6	20				
10	6	30				
11	7	31				
12	8	35				
13	8	25				
14	9	28				
15	10	22				
16	11	31				
17	12	39				
18	12	24				
19	13	32				
20	14	37				
21	15	44				
22						
23						
24						
25						

Next, click the Data tab along the top ribbon. Then click the Data Analysis option within the Analyze group.

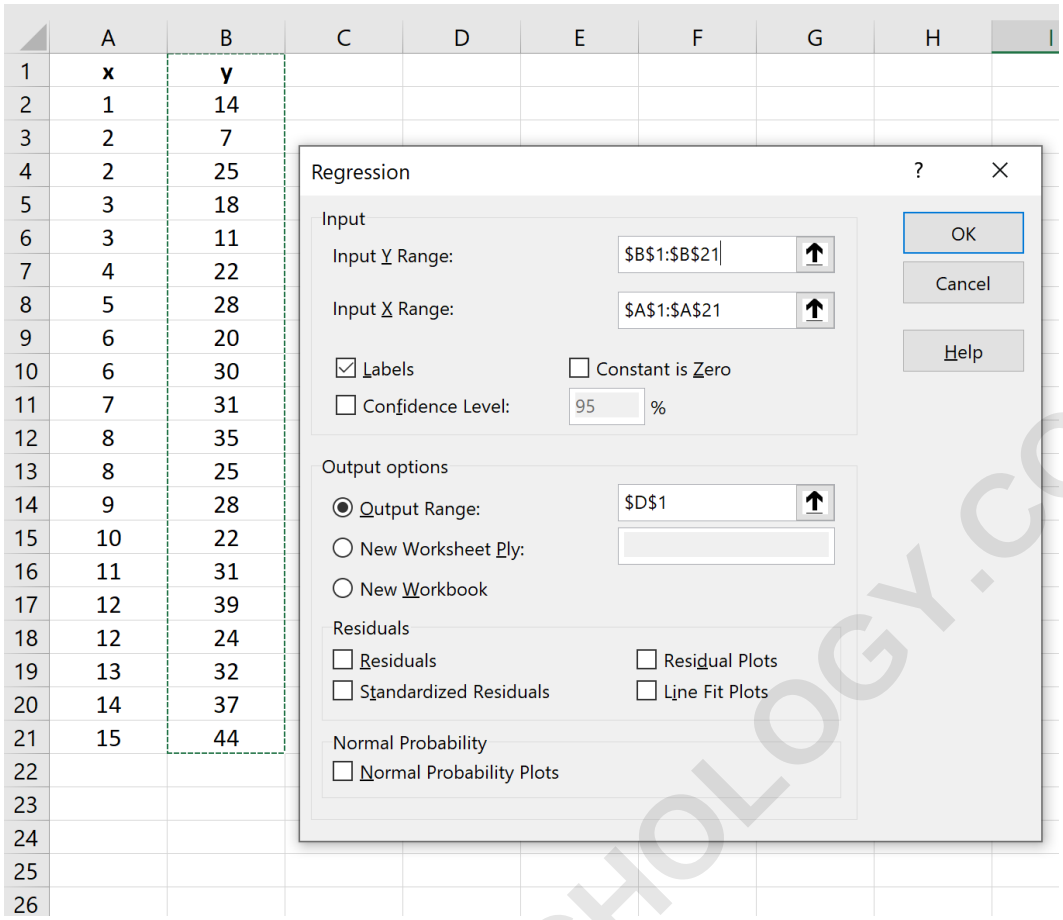


If you don't see this option, you need to first .

In the new window that appears, click Regression and then click OK.



In the new window that appears, fill in the following information:



	A	B
1	x	y
2	1	14
3	2	7
4	2	25
5	3	18
6	3	11
7	4	22
8	5	28
9	6	20
10	6	30
11	7	31
12	8	35
13	8	25
14	9	28
15	10	22
16	11	31
17	12	39
18	12	24
19	13	32
20	14	37
21	15	44

Once you click OK, the regression output will appear:

D	E	F	G	H	I
SUMMARY OUTPUT					
Regression Statistics					
Multiple R	0.782159417				
R Square	0.611773354				
Adjusted R Square	0.590205207				
Standard Error	6.006147209				
Observations	20				
ANOVA					
	df	*SS*	*MS*	*F*	*Significance F*
Regression	1	1023.221523	1023.222	28.36467	4.61142E-05
Residual	18	649.3284774	36.0738		
Total	19	1672.55			
	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*
Intercept	13.36713825	2.750351377	4.860157	0.000126	7.588864428
x	1.693094271	0.317901282	5.325849	4.61E-05	1.025208461

We can use the coefficients from the regression table to construct the estimated regression equation:

? = 13.367 + 1.693(x)

And we can see that the standard error of the estimate for this regression model turns out to be 6.006. In simple terms, this tells us that the average data point falls 6.006 units from the regression line.

We can use the estimated regression equation and the standard error of the estimate to construct a 95%

confidence interval for the predicted value of a certain data point.

For example, suppose x is equal to 10. Using the estimated regression equation, we would predict that y would be equal to:

? = 13.367 + 1.693*(10) = 30.297

And we can obtain the 95% confidence interval for this estimate by using the following formula:

95% C.I. =

For our example, the 95% confidence interval would be calculated as:

95% C.I. = 95% C.I. = 95% C.I. =