

Example 10

Linear fit example using EXCEL

The EXCEL worksheet into which the data is input is shown below. The data is keyed in the cells as shown. The sums required are automatically calculated by using the **SUM** function. **Variiances** and the **covariance** are calculated using their definitions given earlier. The **slopes** and the **intercepts** are calculated using the formulae derived by the **least square** method. The two regression lines are then given by:

$$y_1 = -14.15x + 288.4$$

$$y_2 = -14.74x + 297.6$$



Price per thousand pieces of a certain product (x) determines the demand (y) for the product.							
The data is given below. Fit a straight line to data and discuss the quality of the fit.							
No.	x	y	x ²	y ²	xy	y ₁	y ₂
Mean:	15.667	66.667					
1	15	82	225	6724	1230	76.103	76.495
2	18	25	324	625	450	33.64	32.269
3	13	93	169	8649	1209	104.41	105.98
4	16	60	256	3600	960	61.949	61.753
5	12	128	144	16384	1536	118.57	120.72
6	20	12	400	144	240	5.3309	2.7855
Sum	94	400	1518	36126	5625	400	400
Mean	15.667	66.667					
Variance of x=		7.5556					
Variance of y=		1576.6					
Covariance =		-106.9					
Slope of first regression line=			-14.15				
Intercept of first regression line=			288.42				
Slope of second regression line=			-14.74				
Intercept of first regression line=			297.62				
Correlation coefficient =			-0.98				

The **correlation coefficient** is calculated using the statistical parameters that have been already calculated.

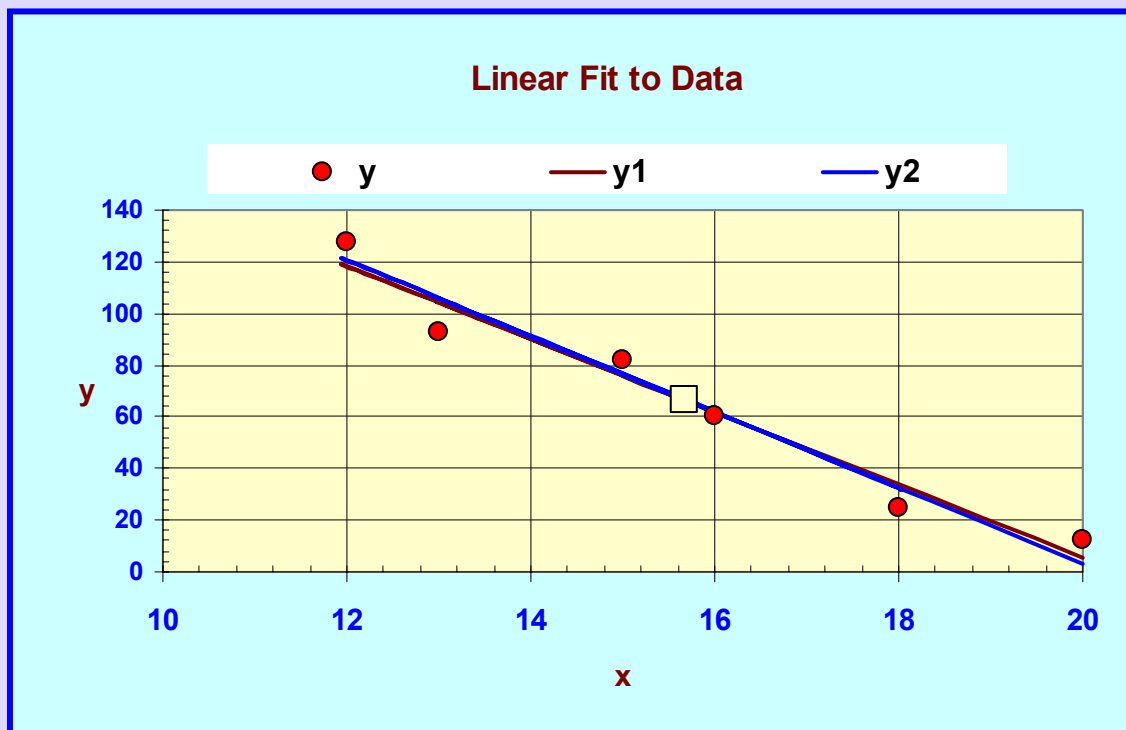


Figure 14 Plot of the resulting data using EXCEL

The data generated has been plotted using **EXCEL** in the form of a **chart** in Figure 14.. The chart option used is "**scatter plot**". The given data is shown using the **red circles**. The two lines of regression are shown by the **brown** and **blue** lines. Both of them pass through the mean x and mean y (indicated by the point□). The fit is good because the two regression lines are very close to each other.

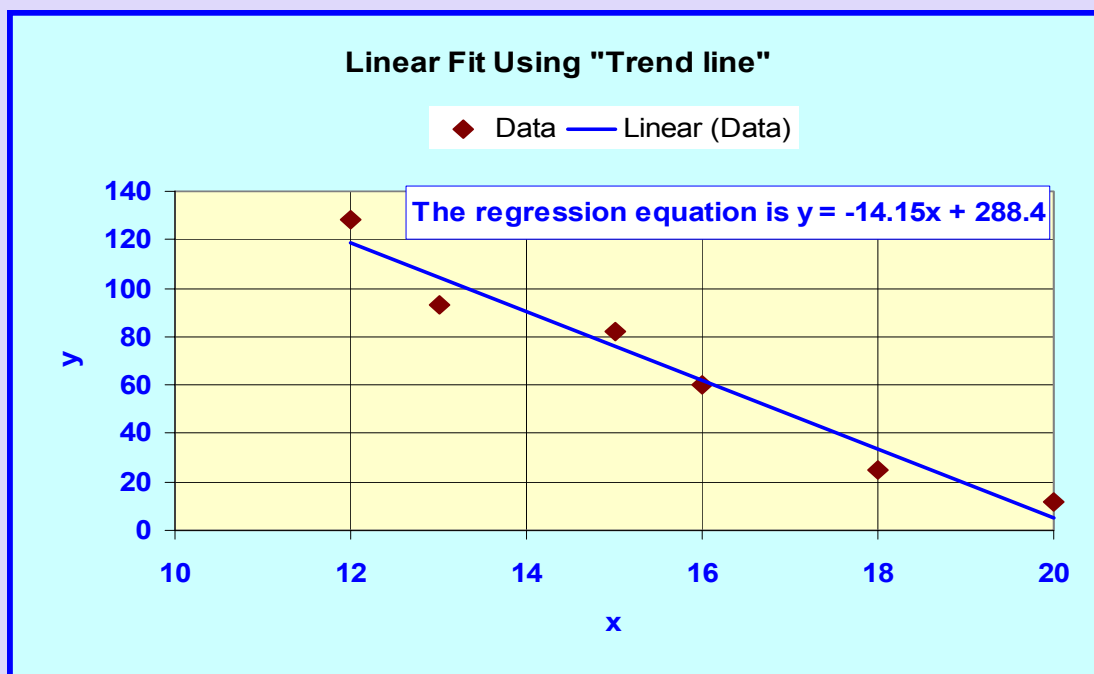


Figure 15 Plot of the data using EXCEL with “Trend Line” option

The **fit** may also be done by using the “**trend line**” option available in **EXCEL**. We choose the **linear** trend line and get the plot shown in Figure 15.

It is observed that the “**Trend Line**” option yields the **first regression line** that considers **y** to be a function of **x**. The required arithmetic is **automatically** performed by **EXCEL**. There is an option to automatically display the regression line equation on the chart.