Tests for Significant Linear Correlation Using Excel

Example #23 p.598 The significance is 0.01. The alternative hypothesis is that there is significant linear correlation. The data shown below represents average speed in kilometers per hour and noise level in decibels for a sample of 8 roads.

Speed	28.26	36.22	38.73	29.07	30.28	30.25	29.03	33.17
Noise	78.1	79.6	81.0	78.7	78.6	78.5	78.4	79.6

Open an Excel spreadsheet. Enter the data for speed in column A. Enter the data for noise in column B.

Enter the formulas shown in cells F4 through F8 in the neighboring cells, E4 through E8. When you have finished typing in the formulas, you will only see the values shown below in cells E4 through E8 that Excel calculates.

The sample size is just the number of pairs of numbers, which can be found by just counting the number of first numbers, i.e. the numbers in A2 through A9.

The correlation coefficient is computed using the list of numbers in column A (A2:A9) and the list of numbers in column B (B2:B9).

	A	B	D	E	F
1	**Speed**	**Noise**			
2	28.26	78.1	Significance =	0.01	
3	36.22	79.6			
4	38.73	81.0	Confidence =	99	=(1–B2)*100
5	29.07	78.7	Sample Size =	8	=COUNT(A2:A9)
6	30.28	78.6	Correlation =	0.9571	=CORREL(A2:A9, B2:B9)
7	30.25	78.5	Test Stat =	8.0886	=E6/SQRT((1-E6^2)/(E5-2))
8	29.03	78.4	P-Value =	0.0002	=T.DIST.2T(E7, E5-2)
9	33.17	79.6			
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The most important values here are the test statistic, 8.0886, and the P-value, 0.0002. Since the P-value, 0.0002, is less than the significance, 0.01, the null hypothesis is rejected. Thus, the conclusion would be that, with 99% confidence, the evidence is strong enough to say there is significant linear correlation between average speed and the noise level.