Answer on Question #55139 – Math – Statistics and Probability

A company is manufacturing cotton threads under different speeds of spindle. The tensile strength of the thread is a parameter that is of interest to the customer. Data on different speeds of spindle and corresponding tensile strength on 5 samples is given. Perform ANOVA to find out which is the most suitable speed for the spindle so as to have maximum tensile strength.

Speed Tensile strength

	1	2	3	4	5
10	22.2	20.6	21.5	20.6	22.0
20	24.2	25.0	24.8	20.7	21.0
30	25.0	23.2	21.7	22.5	20.9

Solution

The null hypothesis: the mean (average value of the dependent variable) is the same for all groups (it means that tensile strength doesn't depend on the speed for the spindle).

The alternative hypothesis: the average is not the same for all groups (it means that tensile strength depends on the speed for the spindle).

The problem can be solved using Anova: Single Factor from Analysis Tools in Microsoft Excel 2013.

Anova: Single factor

SUMMARY

Groups	*Count*	*Sum*	*Average*	*Variance*
speed10	5	106,9	21,38	0,572
speed20	5	115,7	23,14	4,468
speed30	5	113,3	22,66	2,453

ANOVA

Source of variation	*SS*	*df*	*MS*	*F*	*P-Value*	*F critical*
Between groups	8,277333	2	4,138667	1,657013212	0,231500068	3,885293835
Within groups	29,972	12	2,497667			
Total	38,24933	14				

The p-value for the F (1.657) is 0.2315 in our case. Let $\alpha=0.05$. Because $P>\alpha$, we fail to reject the null hypothesis, and we conclude that there is no sufficient evidence to indicate that at least one group has a different average tensile strength.