

Answer on Question #60867 – Math – Statistics and Probability

Question

From a random sample of 22 cities of various sizes, data is collected from police records regarding violations of the narcotic drug laws per 100,000 inhabitants. The communities were broken down into 4 sizes (large cities, small cities, suburban communities, and rural communities), and data was collected over the period of one calendar year. Please determine if there is significant evidence to conclude that the mean rates of arrests for narcotics is different in each community (based on their size). Please conduct this test at the 99% confidence level.

City Community

Large: 45, 34, 41, 42, 37 Suburban: 25, 17, 19, 28, 31, 37

Small: 23, 24, 27, 21, 26, 34 Rural: 13, 16, 14, 17, 10

Solution

Null hypothesis H_0 : all means are equal;

Alternative hypothesis H_a : not all means are equal.

Using Data Analysis Tool 'Anova: Single Factor' from Microsoft Excel obtain the following output:

SUMMARY

Groups	Count	Sum	Average	Variance
Large	5	199	39.8	18.7
Suburban	6	157	26.16667	56.16667
Small	6	155	25.83333	20.56667
Rural	5	70	14	7.5

ANOVA

Source of Variation	SS	df	MS	F	P-value	F crit
Between Groups	1668.852	3	556.2838	20.49906	4.92E-06	5.09189
Within Groups	488.4667	18	27.13704			
Total	2157.318	21				

As we can see the P-value for Between groups equals $4.92 * 10^{-6}$. Therefore, there is significant evidence to conclude that the mean rates of arrests for narcotics is different in each community.