Answer on Question #82839 – Math – Statistics and Probability

Question

The following data shows the amount of money (in USD) spent on food per week, by five randomly selected students. 35 40 30 45 50

i. What is the point of the mean?

ii. Find the 90% confidence interval of the true mean.

Solution

i. The mean of the sample is the point: $\overline{x} = \frac{35+40+30+45+50}{5} = 40.$

ii.

The standard deviation of the sample is

$$s = \sqrt{\frac{(35-40)^2+(40-40)^2+(30-40)^2+(45-40)^2+(50-40)^2}{5-1}}$$

Thus,

$$s = \sqrt{\frac{25 + 0 + 100 + 25 + 100}{4}} = \sqrt{\frac{250}{4}} \approx 7.90$$

For the sample of 5 observations, the number of degrees of freedom will be

$$df = 5 - 1 = 4.$$

For the 90% confidence interval, the right-tale probability will be

$$p = \frac{1 - 0,9}{2} = 0.05$$

We must obtain the t-value from the table for the t-distribution.

For the $df = 4$ and $p = 0.05$ it would be $t = 2.132.$

Thus, the 90% confidence interval will be

$$CI = \overline{x} \pm t \cdot \frac{s}{\sqrt{5}} = 40 \pm 2.132 \cdot \frac{7,90}{2,24} = 40 \pm 7.53.$$