

Math 153 - Quiz 11

November 23, 2017

Name key

Score _____

Show all work to receive full credit. Supply explanations when necessary. YOU MUST WORK INDIVIDUALLY.

1. (5 points) In examining a simple random sample of 150 sales invoices from a previous year, a researcher finds that 62% of them involved sales of less than \$2000 worth of merchandise. Construct a 90% confidence interval estimate for the true proportion of all sales invoices for less than \$2000 in merchandise. Give an interpretation of your interval in a complete sentence.

$$\begin{aligned}n &= 150 \\ \hat{p} &= 0.62 \\ x &= 93\end{aligned}$$

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$$(0.55481, 0.68519)$$

$$C\text{-Level} = 0.90$$

We are 90% confident that the population proportion of sales less than \$2000 is between 55.5% and 68.5%.

2. (2 points) In the problem above, what sample size would be required for a margin of error of 1%?

$$\begin{aligned}C\text{-Level} &= 0.90 \\ \Rightarrow \alpha &= 0.10 \\ \alpha/2 &= 0.05\end{aligned}$$

$$Z_{\alpha/2} = \text{inv Norm}(0.95) \approx 1.645$$

$$n = \frac{(1.645)^2 (0.62)(0.38)}{(0.01)^2} \approx 6375.4$$

Choose $n = 6376$

3. (1 point) In the problems above, what sample size would be required for a margin of error of 1% if no sample proportion had been previously obtained?

$$n = \frac{(1.645)^2 (0.25)}{(0.01)^2} \approx 6765.1$$

Choose $n = 6766$

4. (2 points) A confidence interval for a population mean is given by (68.114, 69.886). Find the point estimate for the population mean and the margin of error.

$$\begin{aligned}E &= (69.886 - 68.114) \div 2 \\ &= 0.886\end{aligned}$$

$$\begin{aligned}\Rightarrow \text{ESTIMATE FOR MEAN} &= 68.114 + 0.886 \\ &= 69\end{aligned}$$