

SOLUTIONS

King Fahd University of Petroleum & Minerals
Department of Mathematical Science
STAT-211-Term042-II

Quiz #7
ID:

Section:
Serial:

Name: _____

Question One (5-Points)

Write **True** if the statement is true or **False** if not:

1. A 95 percent confidence interval estimate will have a margin of error that is approximately \pm 95 percent of the size of the population mean. **False**
2. Increasing the sample size will result in a point estimate that is closer to the true population value. **False**
3. In estimating a population proportion, the factors that are needed to determine the required sample size are the confidence level, the margin of error and some idea of what the population proportion is. **True**
4. The margin of error is the critical value times the standard error of the sampling distribution. **True**
5. In estimating a population mean, increasing the confidence level will result in a higher margin of error for a given sample size. **True**

Question Two (5-Points)

The proportion of parts in an inventory that are outdated and no longer useful is thought to be 0.22. To check this, a random sample of $n = 150$ parts is selected and 30 are found to be outdated. Based upon this information,

1. Find 98 % confidence interval for the true proportion.
2. A pilot sample of size 150 parts reveals that 30 are found to be outdated. Using the information, determine how many **more** items must be sampled to obtain a confidence interval estimate for the population proportion if the confidence level is 90 % and margin of error ± 0.03 .

1.

$$1 - \alpha = 0.98 \Rightarrow Z_{\frac{\alpha}{2}} = Z_{.01} = 2.33, \bar{p} = \frac{x}{n} = \frac{30}{150} = 0.20 \text{ A 98\% C.I. for P is : } \bar{p} \pm Z_{\frac{\alpha}{2}} \sqrt{\frac{p(1-p)}{n}}$$
$$\Rightarrow 0.20 \pm (2.33) \cdot \sqrt{\frac{(0.22)(1-0.22)}{150}} \Rightarrow 0.20 \pm 0.0788 \Rightarrow 0.1212 \dots \dots \dots 0.2788$$

$$1 - \alpha = 0.90 \Rightarrow Z_{\frac{\alpha}{2}} = Z_{.05} = 1.645$$

$$2. n = \frac{Z_{\frac{\alpha}{2}}^2 \bar{p}(1-\bar{p})}{e^2} = \frac{(1.645)^2 (0.2)(0.8)}{(0.03)^2} = 481.07 \approx 482$$

The number of additional items = $482 - 150 = 332$