King Fahd University of Petroleum & Minerals
Department of Mathematics & Statistics
STAT-319-Term063-Quiz5 -SOLUTIONS

Name: ID: Serial:

Question1. (5-points)

The annual income for independent sales representatives in the United States is thought to be highly right-skewed, if a sample of 36 independent sales representatives is selected and yields a mean equal to \$144,300 and a standard deviation of \$32.45. Given this information,

a. Find 98 % confidence interval for the true mean.

$$1-\alpha=0.98 \Rightarrow Z_{\frac{\alpha}{2}} = Z_{.01} = 2.33$$

$$\text{A 98\% C.I. for } \mu \text{ is : } \bar{X} \pm Z_{\frac{\alpha}{2}}.\frac{S}{\sqrt{n}} = 144{,}300 \pm (2.33).\frac{32.45}{\sqrt{36}}$$

$$144{,}300 \pm 12.6014$$

$$144{,}287.4 < \mu < 144{,}312.6$$

b. Suppose it is known that the population standard deviation is \$32.45. Determine how many items must be sampled to obtain the a confidence interval estimate for the population mean if the confidence level is 98 % with a margin of error of $\pm$ 2.5.

$$Z_{\frac{\alpha}{2}} = Z_{.01} = 2.33$$

$$n = \left(\frac{Z_{\alpha/2}.\sigma}{e} \right)^2 = \left(\frac{(2.33).(32.45)}{2.5} \right)^2 = 914.6632 \approx 915$$

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The proportion of parts in an inventory that are outdated and no longer useful is thought to be 0.22. To check this, a random sample of n = 150 parts is selected and 30 are found to be outdated.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

a. Find 98 % confidence interval for the true proportion.

$$Z_{\frac{\alpha}{2}} = Z_{.01} = 2.33\,,\ \hat{p} = \frac{x}{n} = \frac{30}{150} = 0.20 \text{ A 98\% C.I. for P is : } \hat{p} \pm Z_{\frac{\alpha}{2}}.\sqrt{\frac{\hat{p}(1-\hat{p})}{n}}$$

$$\Rightarrow 0.20 \pm (2.33).\sqrt{\frac{(0.20)(1.-0.20)}{150}} \Rightarrow 0.20 \pm 0.0761 \Rightarrow\ 0.1239 < P < 0.2761$$

b. Using the estimated value of P in part(a),determine how many items must be sampled to obtain a confidence interval estimate for the population proportion if the confidence level is 98 % with error $\pm$ 0.03.

$$n = \frac{Z^2_{\frac{\alpha}{2}}(\hat{p}\hat{q})}{e^2} = \frac{(2.33)^2(0.2)(0.8)}{(0.03)^2} = 965.1378 \approx 966$$