Department of Mathematics and Statistics KFUPM
STAT 319-02 Quiz#3, Time: 50 mins

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Q.No.1:- The average amount of meat that a person consumes per year is 218.4 pounds. Assume that the standard deviation is 25 pounds and the distribution is approximately normal.

a) If a sample of 40 individuals is selected, find the probability that the sample mean will be between 215.5 and 221.4 pounds per year.

b) What should be the sample size such that the probability of sample mean (consumption of meat per year) being greater than 226.1 is 5%?

Q.No.2:- An electrical firm manufactures light bulbs that have a length of life that is normally distributed with standard deviation of 40 hours. If a sample of 30 bulbs has an average life of 780 hours,

a) Find a 96% confidence interval for the population mean of all bulbs produced by this firm.

b) How large a sample is needed if we wish to be 96% confident that our sample mean will be within 10 hours of the true mean?

Q.No.3:- A random sample of E-glass fiber test specimens of a certial type yielded a sample interfacial shear yield stress of 30.5 and a sample standard deviation of 3.0. Assuming that interfacial shear yield stress is normally distributed. Compute a 95% confidence interval for true average stress.

a) Use n=8

b) Use n=48

Q.No.4:- In a random sample of 1000 homes in Al-Khober, it is found that 229 are heated by oil.

a) Find a 99% confidence interval for the proportion of homes in Al-Khober that are heated by oil.

b) How large a sample is needed if we wish to be 99% confident that our sample proportion will be 0.05 of the true proportion of homes in Al-Khober that are heated by oil, if we do not have a prior estimate of the proportion?

$\bar{x} = \frac{1}{n}\sum x; \quad s^2 = \frac{\sum x^2 - \frac{1}{n}(\sum x)^2}{n-1}$

Normal Distribution: $X \sim N(\mu, \sigma^2); \quad Z = \frac{X-\mu}{\sigma} \sim N(0,1); \quad Z = \frac{\bar{X}-\mu}{\sigma/\sqrt{n}} \sim N(0,1)$

$\bar{x} \pm Z_{\frac{\alpha}{2}} \frac{\sigma}{\sqrt{n}}$ and $n \geq \left(\frac{\sigma Z_{\frac{\alpha}{2}}}{e}\right)^2$	$\hat{p} \pm Z_{\frac{\alpha}{2}} \sqrt{\frac{\hat{p}(1-\hat{p})}{n}}$ and $n \geq \frac{Z_{\frac{\alpha}{2}}^2[\hat{p}(1-\hat{p})]}{e^2}$
$\bar{x} \pm t_{\frac{\alpha}{2}, n-1} \frac{s}{\sqrt{n}}$	