**Honours Degree of Bachelor of science in Information Technology & Management**
**Batch 21 - Level 2 (Semester II)**
**CM 2111: Statistical Inference**

**Tutorial 04**

01. Let $X_1, X_2, ... X_n$ be a random sample taken from the sampling distribution of sample mean is normal with mean $\mu$ and variance 4/n, that is $\overline{X} \sim N[\mu, 4/n]$. Contrast a 95% confidence interval estimator of $\mu$.

02.

a) Let $X_1, X_2, ... X_n$ be a random sample of size n taken from a population with population proportion $P$. Also let X denotes the number of observations or elements possess a certain attribute (successes) out of n observations of the sample then sample proportion $\hat{p}$ can be defined as $\hat{p} = \frac{X}{n} \leq 1$. Obtain the interval estimator of $P$ with a $100(1 - \alpha)\%$ confidence level.

(Hint: The mean and variance of the sampling distribution of sample proportion are $E(\hat{p}) = p$ and $Var(\hat{p}) = \frac{PQ}{n}$ where, $Q = 1 - p$.

b) A sample of 200 voters is chosen at random from all voters in a given city. 60% of them were in favour of a particular candidate. If large number of voters cast their votes, then find 99% and 95% confidence intervals for the proportion of voters in favour of a particular candidate.

03. Obtain 95% confidence interval to estimate $\theta$ when a large sample is taken from exponential population whose probability density function is given by,

$$f(X,\theta) = \theta e^{-\theta X}, \qquad X > 0, \theta > 0$$

04. The reaction of an individual toa stimulus in a psychological experiment may take one of two forms, A or B. I fan experimenter wishes to estimate the probability $p$ that a person will react in manner A, how many people must be included in the experiment?
Assume that the experimenter will be satisfied if the error of estimation is less than 0.04 with probability equal to 0.90. Assume also that he expects $p$ to lie somewhere in the neighborhood of 0.6.

05. In a continuing study of the amount MBA students are spending each term on text- books, data were collected on $n = 81$ students. In previous studies, the population standard deviation has been $\sigma = \$24$.

a) What is the margin of error at the 99% confidence level?

b) If the mean from the most recent sample was $\bar{x} = 288$, what is the 99% confidence interval estimate of the population mean $\mu$ ?

06. The café ratings data (available on the companion website) consist of a sample of $n = 25$ highly-rated restaurants in a certain U.S. city; the variables include cuisine (for type of cuisine: American, Chinese, French, Italian, and Japanese), rating (for the rating on a 30-point scale), and price (for the average price of a meal). Assume that the $\bar{x} = \$93.46$ and $s = \$75.65$.

a) What is the margin of error at the 95% level of confidence?

b) Find the 95% confidence interval estimate of the population mean $\mu$.