<u>CSE7315c – Lab session – Day04</u>

1. A population of 25-28 year-old males has a mean salary of $29,321 with a standard deviation of $2,120. If a sample of 100 men is taken, what is the probability their mean salaries will be less than $29,000?

2. The engines made by Ford for speedboats had an average power of 220 horsepower (HP) and standard deviation of 15 HP. A potential buyer intends to take a sample of forty engines and will not place an order if the sample mean is less than 215 HP. What is the probability that the buyer will not place an order?

3. A random sample of 225 ROTE exams was selected from the past 25 batches and the number of students absent from each was recorded. We got the average absences as 11.6 with 4.1 standard deviation. Estimate the 90% confidence interval for mean number of absences per tutorial over the past 25 batches.

4. A random sample of 100 items is taken, producing a sample mean of 49. The population std. deviation is: 4. 49. Construct a 90% confidence interval to estimate the population mean.

5. The life in hours of a 75- watt light bulb is known to be normally distributed with σ = 25 hours. A random sample of 100 bulbs has a mean life of x' = 1014 hours. Construct a 95 % confidence interval on the mean life.

6. Click fraud has become a major concern as more and more companies advertise on the internet. When Google places an ad for a company with its search results, the company pays a fee to Google each time someone clicks on the link. That's fine when it's a person who's interested in buying a product or service, but not so good when it's a computer program pretending to be a customer. An analysis of 1200 clicks coming into a company's site during a week identified that 175 of these clicks are fraudulent. Compute the confidence interval with 95% confidence for the proportion of fraudulent clicks.

Testing of Hypothesis:

Working rules for Hypothesis testing:

Step 1: State the Null Hypothesis (H_0) and Alternative Hypothesis(H_1)

H_0: Select the claim that represents equal (=), greater-equal (≥) or less-equal (≤) relationship with the given population parameter value.

H_1: Select the claim that represents not equal (≠), less than (<) or greater than (>) relationship with the given population parameter value.

@remember : H_0 always contains the equal (=) sign.

Step 2: Collect the sample $X_1, X_2, \ldots, X_n$.

Step 3: Calculate the **test** statistic $T_{cal} = f(X_1, X_2, \ldots, X_n)$ depending on the problem statement.

Step 4: Set the level of significance α.

Step 5: Construct Acceptance / Rejection regions depending on α and H_1.

Step 6: Conclusion:

- Reject the null hypothesis: if T_{cal} falls under critical region,
- Do not reject the null hypothesis: if T_{cal} does not fall under critical region.

7. State the null and alternative hypotheses to be used in testing the following claims and determine generally where the critical region is located:

   a. The mean snowfall at Lake George during the month of February is 21.8 centimetres

   b. No more than 20% of the faculty at the local university contributed to the annual giving fund.

8. Suppose a manufacturer claims that the mean lifetime of a light bulb is at least 10,000 hours. In a sample of 30 light bulbs, it was found that they only last 9,900 hours on average. Assuming the population standard deviation to be 120 hours, at 0.05 significance level, can we reject the claim by the manufacturer?