Due Date: April 21st, 2022

Problems due: 1,3,5,7

1. A test is made of $H_0 : \mu = 45$ versus $H_A : \mu > 43$. A sample size of $n = 90$ is drawn and the sample mean is found to be 42. The population is known to be Normal with standard deviation $\sigma = 20$. Decide if there is evidence to reject the null hypothesis at 5% level of significance.

2. A test is made of $H_0 : \mu = 42$ versus $H_A : \mu \neq 42$. The population is known to be Normal with known variance. The test statistic for the z-test is found to be -2.71 Decide if there is evidence to reject the null hypothesis at 1% level of significance.

3. In a simple random sample of size 95, there were 66 individuals in the category of interest. It is desired to test $H_0 : \mu = 0.78$ versus $H_A : \mu < 0.78$. Would you reject the null hypothesis at the 5% level of significance ?

4. If one sees 80 heads in 100 tosses, can one reasonably conclude that the coin is biased? Explain your answer in the context of hypothesis testing.

5. Express the null and the alternative hypothesis for an appropriately designed test:

   (a) The placement committee at ISI claims that the mean annual starting salary for B.Math (Honours) graduating students is greater than Rupees 700,000.

   (b) The standard deviation for measurement of temperature from Siva's thermometer equals 2-degree Celsius.

   (c) The proportion of students in India that suffered from COVID-19 is less than 9%

   (d) The standard deviation of duration times (in minutes) of continuous rainfall in the summer monsoon is less than 35 minutes.

6. The test statistic for hypothesis tests involving a single proportion is given by: $\frac{\hat{p}-p}{\sqrt{\frac{p(1-p)}{n}}}$ Find the value of the test statistic for the claim that the proportion of faculty with black hair equals 0.25, where the sample involved includes 580 faculty with 152 of them having black hair.

7. For each situation below, decide if you reject or fail to reject the null hypothesis:

   (a) The test statistic in a left-tailed test is $z = -1.25$

   (b) The test statistic in a two-tailed test is $z = 1.75$

   (c) With $H_A : \mu \neq 0.707$, the test statistic is $z = -2.75$

   (d) With $H_A : \mu > 0.25$, the test statistic is $z = 2.30$