HYPOTHESIS TESTING: MEAN

TEXT:

1 (4 points)**.** A two-tailed test for the population mean with the sample of size of 11 yields the test statistic of -3.14.

(a) State the distribution of the test statistic:

(b) Sketch the pdf of the test statistic and shade the p-value.

(c) Compute the p-value of the test.

(d) Can H_0 be rejected with $\alpha = 0.05$?

2 (4 points)**.** A two-tailed test for the population mean with the sample of size of 17 yields the test statistic of 1.99.

(a) State the distribution of the test statistic:

(b) Sketch the pdf of the test statistic and shade the p-value.

(c) Compute the p-value of the test.

(d) Can H_0 be rejected with $\alpha = 0.05$?

3 (6 points)**.** Over the course of a few weekends a hospital records the ER wait time for 40 randomly selected patients. The average wait time for this sample is 11 minutes with a standard deviation of 3 minutes. Is there enough evidence to support the hypothesis that the average ER wait time exceeds 10 minutes? Conduct the test at a 10% level of significance.

(a) H_0 : H_1 :

(b) State the distribution of the test statistic:

(c) Sketch a graph of the distribution of the test statistic, find and label the critical point(s), shade the rejection region.

(d) Compute the test statistic and sketch it on the graph above.

(e) Find the p-value of the test.

(f) State the conclusion.

4 (6 points)**.** 15 tobacco smokers were questioned about the number of hours they sleep each day. We want to test the hypothesis that the smokers need a different amount of sleep than the general public, which needs an average of 7.7 hours of sleep. The sample data are given below:

$$7,\ 7,\ 6,\ 6,\ 8,\ 10,\ 7,\ 7,\ 6,\ 5,\ 5,\ 8,\ 8,\ 7,\ 7$$

Is there enough evidence to conclude that smokers need more or less sleep on average than the general population? Conduct the test at 5% level of significance.

(a) H_0 : H_1 :

(b) State the distribution of the test statistic:

(c) Sketch a graph of the distribution of the test statistic, find and label the critical point(s), shade the rejection region.

(d) Compute the test statistic and sketch it on the graph above.

(e) Find the p-value of the test.

(f) State the conclusion.

5. Find a way to use R to generate a random data set of a given size n with mean approximately $\overline{x}$ and standard deviation approximately s, also given.

6. A similar but different task would be to generate a data set of size n, not necessarily random, but with mean and standard deviation being exactly $\overline{x}$ and s. For dessert, implement your method as an R function.