Section #10

1. Yield stress measurements on 51 steel rods with 10-mm diameters gave a mean of 485 N/mm^2 and a standard deviation of 17.2. It is known that the yield stress can be at maximum 490 N/mm^2. Suppose the manufacturer claims that the yield stress for these bars is 490. Does the sample information suggest rejecting the manufacturer's claim at a 5% significance level?

2. It is known that if a test signal with a value $\mu = 8.0$ is sent from the location A, then the value received at the location B is normally distributed with the same mean value and a standard deviation of 2.0. If the test signal was independently sent 5 times from A and the average value from the signals received at B is 9.5, test the hypothesis if the signal value received is $\mu = 8.0$. Assume a 5% significance level.

3. Before agreeing to purchase a large order of polyethylene sheaths for a particular type of high-pressure oil-filled submarine power cable, a company wants to see conclusive evidence that the mean sheath thickness is equal to 8.5 mm. A hypothesis test has been defined, where H_0: μ = 8.5 mm and H_1: μ > 8.5 mm. A sample of 5 sheath measurements has a mean of 8.7 mm. The true standard deviation of the sheath thickness has been independently established as 1.2 mm. If the true mean sheath thickness is 9.5 mm, what is the probability of making a Type II error? Assume that the sheath thickness follows the normal distribution.

4. A corporation sets its annual budget for a new plant on the assumption that the average weekly cost for repairs is to be μ = \$1,200. To see if this claim is realistic, n = 10 weekly repair cost figures are obtained from similar plants. The sample is assumed to be random and yields $\bar{x}$ = 1,290 and S = 110. Since the detection of a departure from the assumed average in either direction would be important for budgeting purposes, it is desired to test H_o: μ = 1,200 versus H_1: $\mu \neq$ 1,200. Use $\alpha = 0.05$.

5. The manufacturer of a new fiberglass tire claims that its average life will be 40,000 miles. To verify this claim a sample of 12 tires is tested, with their lifetimes (in 1,000 of miles) as follows:

Tire	1	2	3	4	5	6	7	8	9	10	11	12
Life	36.1	40.2	33.8	38.5	42	35.8	37	41	36.8	37.2	33	36

   Test the manufacturer claim at 5 percent level of significance.

6. The grades in a statistics course for a particular semester were as follows:

Grade	A	B	C	D	F
Frequency	14	18	32	20	16

   Test the hypothesis, at the 0.05 level of significance, that the distribution of grades is uniform.