HW #10

read pages 316 middle-318, 323-325 middle, 345-348, 351-352, 360-361, 365-371, 375-377

1. Twenty-six observations were taken in a simulation exercise of escape time (in seconds) for oil workers. The sample mean and sample standard deviation for the 26 times were 370.69 and 24.36, respectively. The investigators had believed that true escape time would be at most 6 minutes. Does the data contradict this prior belief? Assuming normality, test using a significance level of .05 .

2. It is claimed that a device expends an average of 46 kilowatt-hours per year . If a random sample of 12 such devices finds an average of 42 kilowatt-hours per year with a sample standard deviation of 11.9 kilowatt-hours, does this suggest (at a .05 level of significance) that the true device average power expenditure is less than the 46 kilowatt-hours per year?

3. It is assumed that the percentage of Type A blood donations is 40%. Test this at the .01 significance level if a random sample of 150 donations yields 82 donations of Type A blood.

4. The human error rate in performing a particular manufacturing task is 3.5%. The factory owners hypothesize that robots doing this task would have a lower error rate, so they sample 500 robot instances of performing this task and find 15 errors. At the .01 significance level, does this data support the hypothesis that the error rate is lower for the robots?

5. A bakery has come up with a new leavening process that they hope will result in a lower calorie loaf of bread. Give the data below, perform a statistical hypothesis test at the 95% significance level to see if the new process has resulted in a statistically significant reduction in calorie per loaf.

New process (number 1): sample size 50 loaves; sample mean number of calories = 1255, sample standard deviation = 213

Old process (number 2): sample size 30 loaves; sample mean number of calories = 1330, sample standard deviation = 238

6. An experiment was performed to compare the abrasive wear of two different laminated materials. Twleve pieces of material 1 were tested and ten pieces of material 2, with the results in units of abrasive wear being:

Material 1: sample average of 85 with a sample standard deviation of 4

Material 2: sample average of 81 with a sample standard deviation of 5

Can we conclude at the 0.05 level of significance that the abrasive wear of material 1 exceeds that of material 2 by more than 2 units?

Assume the populations to be approximately normal with equal variances.

7. Biologists wanted to test the influence of a certain drug on the circulation of androgens in deer. Blood samples from 15 wild deer were obtained immediately upon capture and then 30 minutes after an injection of the drug. Test at the 5% level whether the drug changed the androgen levels in the deer 30 minutes after the injection. Assume the populations of adrogen at the time of injection and 30 minutes later are normally distributed. The data are:

Deer	Time of injection	Androgen (ng/ml) 30 minutes after injection	d_i
1	2.76	7.02	4.26
2	5.18	3.10	−2.08
3	2.68	5.44	2.76
4	3.05	3.99	0.94
5	4.10	5.21	1.11
6	7.05	10.26	3.21
7	6.60	13.91	7.31
8	4.79	18.53	13.74
9	7.39	7.91	0.52
10	7.30	4.85	−2.45
11	11.78	11.10	−0.68
12	3.90	3.74	−0.16
13	26.00	94.03	68.03
14	67.48	94.03	26.55
15	17.04	41.70	24.66

8. In a poll of 200 voters in Town A and 500 voters in Town B, 120 voters in town A voted "yes" on a proposal, while 240 voters voted "yes" on the porposal in Town B. Test at the 2.5% significance level the hypothesis that the population proportion of voters in Town A in favor of the proposition is greater than the population proportion of the voters in Town B in favor of the proposition.