Unit 7 – Hypothesis Testing
Week #11 - Practice Problems

This Assignment is optional
(read: You all get full credit no matter what)

1. ***Before you begin****: This exercise is a two sample(independent groups) t test of equality of means where the variances are unknown but assumed equal. See lecture notes for Unit 7(Hypothesis Testing) pp 40-43. See text pp 304-308.*

An independent testing agency was hired prior to the November 2004 election to study whether or not the work output is different for construction workers employed by the state and receiving prevailing wages versus construction workers in the private sector who are paid rates determined by the free market. A sample of 100 private sector workers reveals an average output of 74.3 parts per hour with a sample standard deviation of 16 parts per hour. A sample of 100 state workers reveals an average output of 69.7 parts per hour with a standard deviation of 18 parts per hour. **You may assume equality of variances in your work**.

   (a)   Is there evidence of a difference in productivity at the 0.10 level of significance?
   (b)   Is there evidence of a difference in productivity at the 0.05 level of significance?
   (c) What is the achieved level of significance?

2.   ***Before you begin****: This exercise is a continuation of the setting in Exercise 1..*

For the data in Exercise 1, what level of significance is achieved by the data if the sample means and sample standard deviations are unchanged but the within group sample sizes are

   (a) both equal to 10
   (b) both equal to 200
   (c) Comment on the role of sample size in the probability of a type I error.

3.   *Before you begin: This exercise is a paired data setting t test of equality of means. See lecture notes for Unit 7(Hypothesis Testing) pp 36-39. See text pp 298-302.*

Halcion is a sleeping pill that is relatively rapidly metabolized by the body and therefore having fewer hangover effects the next morning, compared to other sleeping pills. Opponents of Halcion argue that, because this agent is so rapidly metabolized by the body, patients do not sleep as long with this drug as with Dalmane. Data on 10 insomniacs, each of whom took Dalmane on one occasion and Halcion on a second, is collected. The variable measured is number of hours of sleep:

Patient	Number of Hours Sleep with	
	Dalmane	**Halcion**
1	4.58	3.97
2	5.19	4.88
3	3.94	4.09
4	6.32	5.87
5	7.68	6.93
6	3.48	4.00
7	5.72	5.08
8	7.04	6.95
9	5.27	4.96
10	5.84	5.13

    Do these data suggest that Halcion is not as effective as Dalmane with respect to number of hours of sleep? Carry out an appropriate statistical test and interpret your findings.

4.   *Before you begin: This exercise is a confidence interval for the mean of the difference in the paired data setting. See lecture notes for Unit 6(Estimation) pp 40-43. See text pp 303.*

For the Halcion versus Dalmane data in Exercise 3, construct a 99% confidence interval estimate of discrepancy in the efficacies of the two drugs. Compare this to the acceptance region that would have been obtained had you constructed a statistical test with type I error pre-specified at 0.01.