MATH 21-01 (Introductory Statistics), HW 9 (100 points). Due: 04/25/2017 in class.

Not from textbook (30 pts)

For the problems below, please make use of R commands to calculate the necessary statistical quantities (probabilities and z and t values). Please supply the code you have used.

- 1. Suppose that a sample 100 tires lasted an average of 21,500 miles with a std deviation of 1298 miles. Test the null hypothesis that for this brand of tires the avg lifetime is $\mu = 22,000$ miles against the alternative hypothesis $\mu < 22,000$ at the 0.05 level of confidence. What's your conclusion?

- 2. An experiment is performed to determine whether the avg mercury content in 1 kg packs of one kind (brand) of wild salmon exceeds that of another kind by .20 mg. Suppose $n_1 = 30$ salmon packages of the first kind were sampled and yielded an avg mercury content of $\bar{x}_1 = 2.61$ mg with a std deviation of 0.12 mg. For the second brand of salmon, $n_2 = 25$ packages were sampled and yielded $\bar{x}_2 = 2.38$ mg with sample std deviation of 0.14 mg. Test the null hypothesis $\mu_1 - \mu_2 = 0.20$ against the alternative hypothesis $\mu_1 - \mu_2 \neq 0.20$ at the 0.05 level of significance. What's your conclusion?

- 3. Let a population be normal with known variance $\sigma^2 = 0.25$ and unknown mean μ. Suppose a hypothesis test is set up for the population mean μ where:

$$H_0 : \mu = 1 \quad \text{versus} \quad H_1 : \mu = 2$$

Let $\bar{x}$ denote the mean of a random sample of 10 values from the population. Suppose the following decision rule is used: *Reject H_0 when $\bar{x} > 1.40$.* Find the probabilities of type I and type II errors for this test.

From textbook (70 pts)

Section 7.4: 6, 13
Section 8.2: 3, 5, 27
Section 8.3: 10, 13
Section 8.4: 13, 15, 18