

# MATH 252-01: Probability and Statistics II

## Problem Set 4

Assigned 2016 September 13  
Due 2016 September 20

Show your work on all problems! If you use a computer to assist with numerical computations, turn in your source code as well.

**1 Devore Chapter 7, Problem 44**

**2 Devore Chapter 8, Problem 10**

**3 Devore Chapter 8, Problem 30**

**4 Computational Exercise**

Download the following data set which is a sample of size  $n = 30$  from a normal distribution with unknown  $\sigma$ :

[http://ccrg.rit.edu/~whelan/courses/2016\\_3fa\\_MATH\\_252/data/ps04\\_prob4.dat](http://ccrg.rit.edu/~whelan/courses/2016_3fa_MATH_252/data/ps04_prob4.dat)  
using the username and password given in class.

- a. Consider the null hypothesis  $H_0 : \mu = 0$  and the alternative hypothesis  $H_a : \mu \neq 0$ . Carry out the appropriate test at 90% confidence level, and indicate whether you would reject  $H_0$  in favor of  $H_a$ . If you use a software package like minitab which performs the test for you, explain the meaning of each of the quantities it outputs.
- b. Your results from part (a) should contain the quantities needed to construct the test statistic by hand. Explicitly combine them and compare to the percentiles of the  $t$  distribution appropriate for this sample size, and to the standard normal distribution. Comment on the appropriateness of the large sample approximation in this case.
- c. Now change the alternative hypothesis to  $H'_a : \mu > 0$  and repeat the test.
- d. Return to the original alternative hypothesis  $H_a : \mu \neq 0$ , and now assume that the population standard deviation is known to be  $\sigma = 5$ . Carry out the appropriate test in this case.