Assignment #9 — Due Monday, November 28 by 4:00 P.M.

Turn in homework to your TA’s mailbox using this sheet as the cover page.

Fill in your name and also circle the lecture section in which you are registered and circle the discussion section you expect to attend to pick up this assignment.

Name:

Lecture 1 (Hanlon).  
311: Tu 1:00 - 2:15pm  312: Th 8:00 - 9:15am  313: We 1:00 - 2:15pm

Lecture 2 (Larget).  
321: Tu 1:00 - 2:15pm  322: We 2:30 - 3:45pm  323: We 1:00 - 2:15pm

Please answer the following questions.

1. The following questions concern sample size calculations for proportions.
   (a) How large of a sample is needed for a 95% confidence interval to have a margin of error \( \leq 0.01 \).
   (b) How large of a sample is needed for a 95% confidence interval to have a margin of error \( \leq 0.001 \).

2. The following questions concern sample size calculations for the mean of a normal population. Recall that these problems require a guess for \( \sigma \), the standard deviation of the population.
   (a) Let \( \sigma = 1 \). How large of a sample is needed for a 90% confidence interval to have a margin of error \( \leq 1.0 \).
   (b) Let \( \sigma = 4 \). How large of a sample is needed for a 95% confidence interval to have a margin of error \( \leq 0.01 \).
   (c) Let \( \sigma = 10 \). How large of a sample is needed for a 99% confidence interval to have a margin of error \( \leq 0.05 \).

3. The following questions concern power calculations for hypothesis tests regarding the mean of a normal population. Recall that these problems require a guess for \( \sigma \), the standard deviation of the population. Here \( n \) denotes the sample size and \( \alpha \) denotes the significance level of the test.
   (a) Let \( \sigma = 1, n = 25, \alpha = .05 \). Find the rejection region for the test \( H_0 : \mu = 5 \) vs. \( H_A : \mu \neq 5 \). What is the power of the test at \( \mu = 4.7 \)?
   (b) Let \( \sigma = 10, n = 50, \alpha = .05 \). Find the rejection region for the test \( H_0 : \mu = 100 \) vs. \( H_A : \mu > 100 \). What is the power of the test at \( \mu = 105 \)?
   (c) Let \( \sigma = 2, n = 100, \alpha = .01 \). Find the rejection region for the test \( H_0 : \mu = 7 \) vs. \( H_A : \mu < 7 \). What is the power of the test at \( \mu = 6.5 \)?