Homework 12 **Name:** _____

Prob. and Stat. for Eng. (STAT:2020; Bognar)

Print this pdf file, show your work in the provided space, use scanning app to scan pages (in order) into a single pdf file, submit in Gradescope. Be sure to get entire page in each shot — lay each page flat when scanning. You can use an iPad/tablet too.

1. Textbook 9.4 ((a) only, $s = 6.9$)

   (a)

2. Textbook 9.6 ($\sigma = 40$)

3. Textbook 9.10 ($s = 7.8$)

4. Textbook 9.12 ($s = 15$)

5. The longevity of truck tires (in thousands of miles) follows a normal distribution with mean μ and standard deviation $\sigma = 20$. Suppose $n = 64$ tires are randomly selected and the sample mean $\bar{x} = 76.5$.

   (a) Test $H_0 : \mu = 75$ versus $H_a : \mu \neq 75$ at the $\alpha = 0.05$ significance level using a 3-step test.

   (b) Based upon your answer in part (a), does μ significantly differ from 75? Why?

   (c) Find the $p-$value for the test in part (a).

   (d) Based upon your answer in part (c), does μ significantly differ from 75? Why?

   (e) Find a 95% confidence interval for μ.

   (f) Based upon your answer in part (e), does μ significantly differ from 75? Why?

   (g) If the longevities were not normally distributed, could we still do inference for μ? Why?

6. A coffee shop knows that the temperature of their coffees has a distribution that is skewed to the left with mean μ degrees and standard deviation $\sigma = 8$ degrees. A random sample of 36 coffees yielded a sample mean temperature $\bar{x} = 187$ degrees.

   (a) Test $H_0 : \mu = 190$ versus $H_a : \mu \neq 190$ at the $\alpha = 0.01$ significance level using a 3-step test.

   (b) Based upon your answer in part (a), does μ significantly differ from 190? Why?

   (c) Approximate the $p-$value for the test in part (a).

   (d) Based upon your answer in part (c), does μ significantly differ from 190? Why?

   (e) Find a 99% confidence interval for μ.

   (f) Based upon your answer in part (e), does μ significantly differ from 190? Why?

   (g) Suppose the sample size was 10, not 36. Could we still do inference for μ? Why?

7. Suppose a researcher tests $H_0 : \mu = 125$ versus $H_a : \mu \neq 125$ at the $\alpha = 0.05$ significance level. If $\sigma = 12$ and a 96.6% confidence interval for μ is (118.26,126.74), find the $p-$value of the test.

8. Suppose a random sample of size 9 was obtained from a normal population with mean μ and standard deviation $\sigma = 6.3$. It was determined that the $p-$value for the test $H_0 : \mu = 80$ versus $H_a : \mu \neq 80$ was 0.8336.

   (a) If $\bar{x} > \mu$, find a 95% confidence interval for μ.

   (b) Approximately how large of a sample size n would be needed for the margin of error (at 95% confidence) to equal 2.0?