Homework — Inference for μ (σ known)
Prob. and Stat. for Eng. (STAT:2020; Bognar)

1. 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?

2. 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?