1. Assume a sample of $n = 10$ observations was randomly sampled from a normal distribution with $\sigma = 5$. Suppose that $\overline{x} = 78$.

   (a) test $H_0 : \mu > 80$, assuming $\alpha = 0.05$

   (b) produce a plot of the standard normal distribution that shows both the rejection region and the sample z-score.

   (c) compute a 95% confidence interval. Is this interval consistent with your decision in part (a)? Explain.

   (d) determine the p-value.

2. Assume a sample of $n = 49$ observations was randomly sampled from a normal distribution with $\sigma = 5$. Suppose that $\overline{x} = 120$.

   (a) test $H_0 : \mu = 130$, assuming $\alpha = 0.01$.

   (b) produce a plot of the standard normal distribution that shows both the rejection region and the sample z-score.

   (c) compute a 99% confidence interval. Is this interval consistent with your decision in part (a)? Explain.

   (d) determine the p-value.

3. An antipollution device for cars is claimed to have an average effectiveness of exactly 546. Based on a test of 20 such devices, you find that $\overline{x} = 565$. Assuming normality and that $\sigma = 40$, would you rule out the claim with a Type I error probability of 0.05?

4. For $n = 36$, $\alpha = 0.01$, $\sigma = 8$, and $H_0 : \mu \leq 100$, compute the power obtained when $\overline{x} = 103$.

5. For $n = 49$, $\alpha = 0.05$, $\sigma = 10$, and $H_0 : \mu = 50$, compute the power obtained when $\overline{x} = 47$.