Homework Solutions
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Exercise 32

(a) Use the boxplots at the end of the problem. The quickest commute time is the outlier in the second boxplot. Its value appears to be 10 minutes.

(b) The formula is

$$s_p = \sqrt{\frac{(n_1-1)s_1^2 + (n_2-1)s_2^2}{n_1+n_2-2}}.$$

We calculate

$$\begin{aligned} s_p &= \sqrt{\frac{39 \cdot 5.87^2 + 39 \cdot 6.24^2}{78}} \\ &= 6.058. \end{aligned}$$

(c) Yes. 5.87 and 6.24 are pretty close.

(d) Let μ_1 be the mean commute time for Route 1 and μ_2 be the mean commute time for Route 2. The hypotheses are

$$\begin{aligned} H_0 &: \quad \mu_1 = \mu_2 \\ H_1 &: \quad \mu_1 > \mu_2 \end{aligned}$$

(e) The test statistic is

$$\begin{aligned} t &= \frac{\overline{x}_1 - \overline{x}_2}{s_p\sqrt{\frac{1}{n_1}+\frac{1}{n_2}}} \\ &= \frac{31.945 - 28.105}{6.058\sqrt{\frac{1}{40}+\frac{1}{40}}} \\ &= \frac{3.840}{2.142} \\ &= 1.793. \end{aligned}$$

The p-value is `tcdf(1.793,E99,78)` $= 0.384$. At the 5% level of significance, our decision is to reject H_0.

(f) Thus, Route 2 DOES appear to be significantly quicker than Route 1 on average.