Homework Solutions
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Exercise 14

(a) The five-number summary for the fish data is

$$\text{Minimum} = 13.2$$
$$Q_1 = 15.0$$
$$\text{Median} = 15.55$$
$$Q_3 = 16.55$$
$$\text{Maximum} = 20.9$$

The IQR is $Q_3 - Q_1 = 16.55 - 15 = 1.55$. The upper fence is

$$Q_3 + 1.5 \times \text{IQR} = 16.55 + 2.325 = 18.875.$$

By this standard, 20.9 is an outlier.

(b) For the remaining 55 numbers, we have $\overline{x} = 15.753$ and $s = 1.183$. Now run the test.

1. Let μ be the average width percent.

   $H_0: \quad \mu = 16$
   $H_1: \quad \mu < 16$

2. $\alpha = 0.10$.

3. The test statistic is $t = \dfrac{\overline{x} - \mu_0}{s/\sqrt{n}}$.

4. $t = \dfrac{15.753 - 16.0}{1.183/\sqrt{55}} = -\dfrac{0.247}{0.1596} = -1.5480$.

5. p-value $= \texttt{tcdf(-E99,-1.5480,55)} = 0.0637$.

6. Reject H_0.

7. The average width percent is less than 16.

(c) The removal reversed the results. The mean was lower, i.e., further below 16, and the standard deviation was less, meaning that the larger difference in means is even more significant, as exhibited by the much smaller p-value.