Homework Solutions
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Exercise 13

(a) Let $\mu_D = \mu_{\text{Scale 1}} - \mu_{\text{Scale 2}}$. Then the hypotheses should be

$$H_0: \quad \mu_D = 0$$
$$H_1: \quad \mu_D \neq 0$$

(b) The most important assumption is that the weight differences have a normal distribution.

(c) In most cases, Scale 2 recorded a lower weight than did Scale 1. In one case, the weights were equal and in another case, Scale 2 recorded a higher weight.

(d) This is done in the same manner as in Chapter 10 with $\overline{x}$. That is, the formula for the confidence interval is

$$\overline{d} \pm t\left(\frac{s_D}{\sqrt{n}}\right).$$

Using `1-Var-Stats`, we find that $\overline{d} = 2.6$ and $s_D = 2.302$. Also, with 4 degrees of freedom and 95% confidence, the value of t is 2.776 (quite a bit larger than the normal 1.960). So the confidence interval is

$$\begin{aligned}\overline{d} \pm t\left(\frac{s_D}{\sqrt{n}}\right) &= 2.6 \pm 2.776\left(\frac{2.302}{\sqrt{5}}\right) \\ &= 2.6 \pm 2.858.\end{aligned}$$

(e) (ii) Greater than 0.05 (i.e., accept H_0). The confidence interval has an "error" probability of 5% and the interval includes the value 0. Therefore, at the 5% level, we have to consider 0 to be a reasonably likely value of μ_D. So, had we run the test at the 5% level, we would have accepted H_0.