Homework Solutions
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Exercise 9

(a) Let μ be the average amount of syrup in a bottle. The hypotheses are
$$H_0: \quad \mu = 16$$
$$H_1: \quad \mu \neq 16$$

(b) The sample must be a simple random sample. If the sample size is small, then the population needs to be normal.

(c) A Type I error would be to assume that the average is not 16 oz when it really is. So the company would shut the machines down and investigate needlessly.

(d) A Type II error would be to believe that the average is 16 oz when it is not. The consequences would be either that the customers are unhappy because they are not getting enough syrup or the company would be putting too much syrup in the bottles and thereby losing money.

(e) "Perform the test" means to show all seven steps. Step 1 has already been done, so we will resume with Step 2.

   2. $\alpha = 0.05$.

   3. $t = \frac{\bar{x} - \mu_0}{s/\sqrt{n}}$. We have to assume that the sampled population is normal.

   4. $t = \frac{15.8 - 16.0}{0.7\sqrt{20}} = -\frac{0.2}{0.1565} = -1.278$.

   5. p-value $= 2 \times$ `tcdf(-E99,-1.278,19)` $= 0.2167$.

   6. Accept H_0.

   7. The average amount of syrup per bottle is 16 oz.

(f) I would recommend that they not shut the machines down, but continue to produce syrup.