Test 2 Review 2 Solutions

1) D

2) B

3) C

4) D

5) Since both products have the same mean and are both normally distributed, the one with the largest standard deviation will provide the highest probability of a heavy sack. Since potatoes have a standard deviation of 2 pounds compared to 0.50 pounds for onions, you would be more apt to see a very heavy sack of potatoes than onions.

6) When the population distribution is known to be normally distributed, the sampling distribution of $\bar{x}$ will also be normally distributed. Further, the mean of the sampling distribution will be equal to the population mean, 44.2, and the standard deviation of the sampling distribution will be $\frac{5.6}{\sqrt{n}}$.

7) A pilot sample is used when we wish to determine a required sample size to estimate a population mean or a population proportion. The pilot sample is a sample that is smaller than the final sample that will be needed to complete the estimation. It is used to obtain information about the variation in the population. In the case where we wish to estimate a population mean, in most cases we don't know what the population standard deviation is. From a pilot sample, we compute s, the sample standard deviation and use that value in the sample size computation. When we wish to estimate a population proportion, the pilot sample is used to get an idea of what π is. From the pilot sample, we compute p, the sample proportion and use that in the sample size formula.
It should be remembered that the pilot sample is selected in the same manner as the final sample will be selected. Thus, the pilot sample can be used as part of the overall sample.

8) The company will take action if it determines that the fill process is putting too little or too much in the cans on average. Therefore, the research hypothesis is that the population mean is not equal to 12 ounces. Given this, the null and alternative hypothesis are:

$H_0 : \mu = 12$ ounces

$H_a : \mu \neq 12$ ounces.

We note that the hypothesis test is two-tailed since we can reject it if the sample mean gets too large or too small. Thus, there are actually two critical values, one on each side of the distribution. We find the critical values as follows:

$$\mu \pm z\frac{\sigma}{\sqrt{n}}.$$

Because this is a two-tailed test, we must split the alpha into two parts of 0.025 each.

The z-value from the standard normal distribution for 0.5000 - 0.025 = 0.475 is 1.96. Given this, the critical values are determined as:

$$12.0 \pm 1.96\frac{0.20}{\sqrt{36}} \text{ or } 12.0 \pm 0.0653.$$

Thus, the decision rule is:

If $11.9347 \leq \bar{x} \leq 12.0653$, reject the null hypothesis, otherwise do not reject.

9) FALSE

10) FALSE

11) FALSE

12) FALSE

13) TRUE