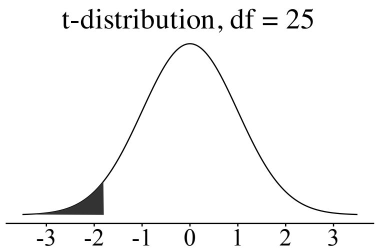
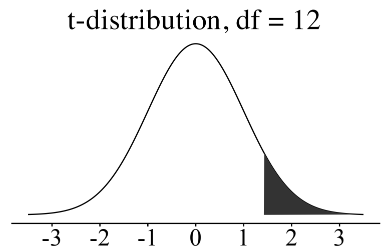
Lesson 10.3.2

10-48. a. 0.042. See diagram below left.

b. 0.09 (df = 12). See diagram below right.

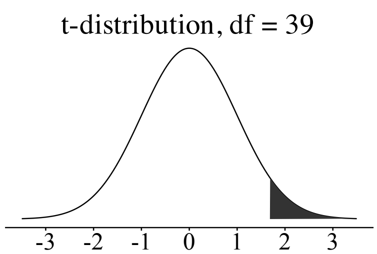


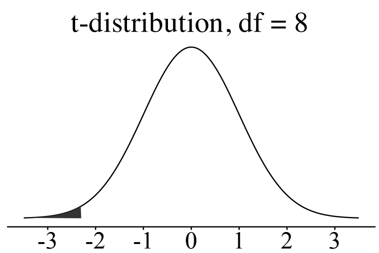


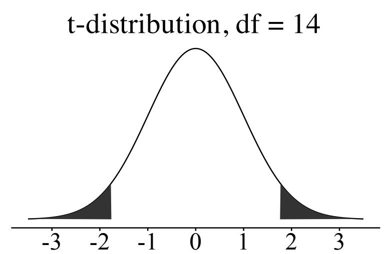
c. 1.685. See diagram below left.

d. –2.31 (df = 8). See diagram below middle.

e. ± 1.76 (df = 14). See diagram below right.







10-49. a. The residents of Smallville, WI.

b. That is the random condition, and this situation satisfies it since it states it is an SRS.

c. Independent trials, and this situation satisfies the condition since 10(35) < 6792.

d. Large sample size/normal population condition, which this satisfies by the Central Limit Theorem since $n > 30$.

e. $SE_{\bar{x}} = \frac{s}{\sqrt{n}} = \frac{1.1}{\sqrt{35}} \approx 0.186$

f. The t-distribution has 34 degrees of freedom. The critical value is 1.69.

g. The interval is 3.2 ± 0.31. You can be 90% confident that the average servings of cheese per week eaten by residents of Smallville, WI is between 2.89 and 3.51 servings.

10-50. This interval will depend on your data. Confirm the answer with your entire class!

10-51. a. t-interval. $12.1 \pm 1.869\left(\frac{4.3}{\sqrt{17}}\right) = 12.1 \pm 1.95$ or (10.15, 14.05).

b. proportion z-interval. $0.221 \pm 1.555\sqrt{\frac{0.222(0.778)}{325}} = 0.221 \pm 0.036 = (0.186, 0.257)$

c. Since 5 g is a population standard deviation, can use a z-interval.
$343 \pm 2.33\left(\frac{5}{\sqrt{25}}\right) = 343 \pm 2.3 = (340.7, 345.3)$

10-52. a. population

b. Yes. Random—he chose four random spots. Independent trials—it is reasonable to assume there were more than $4 \cdot 10 = 40$ spots he could have measured. Normal population—mentioned in the problem that temperature varies normally.

c. Since you know σ, can use the normal critical value of 1.96. $35.1 \pm (1.96)\left(\frac{1}{\sqrt{4}}\right) = 35.1 \pm 0.98$. You can be 95% confident that the true average temperature in David's refrigerator is between 34.1 and 36.1 degrees Fahrenheit.

d. If David were to repeat this measuring process many times and calculate the confidence interval each time, his interval would capture the true mean about 95% of the time.

10-53. Since the population standard deviation is unknown, this situation needs to be modeled using a t-distribution. These problems are solved by setting up formulas in the style "margin of error < 3" and solving for n. In this case, however, the formula for the margin of error is $t^*\left(\frac{s_x}{\sqrt{n}}\right)$. Since t^* and s_x are both unknown until a sample size has been chosen and a sample obtained, Summer cannot solve the inequality! However, because small margins of error usually result in larger sample sizes, the normal distribution can often be a reasonable approximation due to the large n that results. She could use $z^* = 1.96$, assuming the resulting n is reasonably large. For example, if her sample size needed was $n = 100$, then t^* would be 1.984, and $z^* = 1.96$ would be an acceptable substitute. It would only slightly underestimate the sample size required.

10-54. $0.15(–5.50) + 0.05(–8) + 0.79(0) + 0.01(–(1^{\text{st}}\text{ prize})) + 5 = 1$, \$277.50

10-55. a. Use a binomial distribution $E(X) = 2500 \cdot \frac{1750}{350000} = 12.5$, $\frac{1750}{350000} = 0.005$. Standard deviation is $\sqrt{0.05 \cdot 0.995 \cdot 2500} = 3.5267$

b. $P(X < 10) = \text{binomcdf}(2500, 0.005, 9) = 0.2008$

c. Take a stratified random sample based on the expected value associated with each application type. For example, you would want to have 12 buyers of book apps.

