Math 10 - Homework Chapter 7 Answers

1. High Fructose Corn Syrup (HFCS) is a sweetener in food products that is linked to obesity and type II diabetes. The mean annual consumption in the United States in 2008 of HFCS was 60 lbs with a standard deviation of 20 lbs. Assume the population follows a Normal Distribution.

   a. In a sample of 16 Americans, what is the probability that the **sample mean** will exceed 57 pounds of HFCS per year?
   P(XBAR>57) = P(Z>(57-60)/(20/sqrt(16))=P(Z>-0.60)=1 - 0.2743 = 0.7257

   b. In a sample of 16 Americans, what is the probability that the **sample mean** will be between 50 and 70 pounds of HFCS per year.
   P(50<XBAR<70) = P((50-60)/(20/sqrt(16))<Z<(70-60)/(20/sqrt(16))
   =P(-2.00<Z<2.00)= = 0.9772 - 0.0228 = 0.9544

2. A normally distributed population of package weights has a *mean* of 63.5 g and a *standard deviation* of 12.2 g.

   a. What percentage of this population weighs 66 g or more?
   P(X>66) = P(Z>(66-63.5)/12.2)=P(Z>0.20)=1-.5793=.4207

   b. If you sample 49 packages, find the probability the sample mean is over 66 g. Compare this answer to part a.
   P(Xbar>66) = P(Z>(66-63.5)/[12.2/sqrt(16)]=P(Z>0.82)=1-.7939=.2061 lower since sdev is lower.

   c. If you sample 49 packages, find the probability the sample mean is over 66 g. Compare this answer to part a.
   P(Xbar>66) = P(Z>(66-63.5)/[12.2/sqrt(49)]=P(Z>1.43)=1-.9236=.0764 lower since sdev is lower.

3. A pollster sampled 100 adults in California and asked a series of questions. The Central Limit Theorem for Proportions requires that np > 10 and n(1-p) > 10. Determine if these conditions are met for the following statements.

   a. 61% of Californians live in Southern California.
   np=61, n(1-p)=39 – both more than 10 - yes

   b. 92% of Californians support Deferred Action for Childhood Arrivals (DACA)
   np=92, n(1-p)=8 – n(1-p) less than 10 - no

   c. 8% of Californians have a felony conviction.
   np=8, n(1-p)=92 – np less than 10 - no

4. 24% of Californians have visited Yosemite National Park. A pollster samples 1000 Californians.

   a. Determine the expected value and standard deviation of the sample proportion.
   Mean = p = 0.24   std dev = sqrt(0.24(1-0.24)/1000) = 0.0135

   b. Determine that the condition for normality is satisfied.
   np=240, n(1-p)=760 – both more than 10 – yes

   c. Determine the probability the sample proportion exceeds 0.40.
   P(p-hat>0.40) = P(Z>(0.40 – 0.24)/0.0135) = P(Z>11.85) = 0