

Math 10 - Homework Chapter 6 Answers

4. 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. Find the probability a randomly selected American consumes more than 50 lbs of HFCS per year.

$$P(X > 50) = P(Z > (50 - 60) / 20) = P(Z > -0.50) = 1 - .3085 = .6915$$

b. Find the probability a randomly selected American consumes between 30 and 90 lbs of HFCS per year.

$$P(30 < X < 90) = P((30 - 60) / 20 < Z < (90 - 60) / 20) = P(-1.50 < Z < 1.50) = .9332 - .0668 = .8664$$

c. Find the 80th percentile of annual consumption of HFCS.

$$Z_{.80} = 0.84 \quad X_{.80} = 60 + (0.84)(20) = 76.8 \text{ lbs. per year}$$

d. In a sample of 40 Americans how many would you expect consume more than 50 pounds of HFCS per year.

$$P(X > 50) = .6915 \text{ from part A. Expected Value} = 40(.6915) = 27.7 \text{ or about } 28 \text{ out of } 40.$$

e. Between what two numbers would you expect to contain 95% of Americans HFCS annual consumption?

$$(60 - 1.96(20), 60 + 1.96(20)) \text{ or } 20.8 \text{ to } 99.2 \text{ lbs. per year}$$

f. Find the quartiles and Interquartile range for this population.

$$Z_{.25} = -0.67 \quad Z_{.50} = 0 \quad Z_{.75} = 0.67 \quad X_{.25} = 60 - (0.67)(20) = 46.6 \text{ lbs} \quad X_{.50} = 60 \text{ lbs}$$

$$X_{.75} = 60 + (0.67)(20) = 73.4 \text{ lbs}$$

$$IQR = 73.4 - 46.6 = 26.8 \text{ lbs per year}$$

g. A teenager who loves soda consumes 105 lbs of HFCS per year. Is this result unusual? Use probability to justify your answer.

$$P(X > 105) = P(Z > (105 - 60) / 20) = P(Z > 2.25) = 1 - 0.9878 = 0.0122 \text{ Unusual result}$$

5. 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. What percentage of this population weighs 41 g or less?

$$P(X < 41) = P(Z < (41 - 63.5) / 12.2) = P(Z < -1.84) = .0329$$

c. What percentage of this population weighs between 41 g and 66 g?

$$P(41 < X < 66) = P((41 - 63.5) / 12.2 < Z < (66 - 63.5) / 12.2) = P(-1.84 < Z < 0.20) = .5793 - .0329 = .5464$$

d. Find the 60th percentile for distribution of weights.

$$Z_{60} = 0.25 \quad X_{60} = 63.5 + (0.25)(12.2) = 66.55 \text{ g}$$

e. Find the three quartiles and the interquartile range.

$$Z_{25} = -0.67 \quad Z_{50} = 0 \quad Z_{75} = 0.67 \quad X_{25} = 63.5 - (0.67)(12.2) = 55.3 \text{ g} \quad X_{50} = 63.5 \quad X_{75} = 63.5 + (0.67)(12.2) = 71.7 \text{ g} \\ \text{IQR} = 71.7 - 55.3 = 16.4 \text{ g}$$