Warning, to get your answers, correct to 2 places, you must calculate your std. devs. to 4 places. Suggestion: instead of and rounding copies intermediate values, save them to a variable in you calculator.

7.27ab The normal daily human potassium requirement is in the range of 2000 to 6000 milligrams (mg), with larger amounts required during hot summer weather. The amount of potassium in food varies, depending on the food. For example, there are approximately 7 mg in a cola drink, 46 mg in a beer, 630 mg in a banana, 300 mg in a carrot, and 440 mg in a glass of orange juice. Suppose the distribution of potassium in a banana is normally distributed, with mean equal to 630 mg and standard deviation equal to 40 mg per banana. You eat n = 3 bananas per day, and T is the total number of milligrams of potassium you receive from them.

(a) Find the mean and std. dev. of T.

\[ \mu = \sigma = \]

(b) Find the probability that your total daily intake of potassium from the three bananas will exceed 2000 mg. (Hint: Note that T is the sum of three random variables, \( x_1, x_2, x_3 \) where \( x_i \) is the amount of potassium in banana number \( i \) )

7.29 Random samples of size \( n \) are selected from binomial populations with success probabilities \( p \). Find the mean and the standard deviation of the sampling distribution of the sample proportion \( \hat{p} \) in each case.

(a) \( n = 100, \; p = .3 \)

(b) \( n = 400, \; p = .1 \)

(c) \( n = 250, \; p = .6 \)

7.33abdfg Calculate \( \sigma_{\hat{p}} \) for \( n = 100 \) and the given value of \( p \).

(a) \( p = .01 \)

(b) \( p = .10 \)

(d) \( p = .50 \)

(f) \( p = .90 \)

(g) \( p = .99 \)

7.35abc One of the ways most Americans relieve stress is to reward themselves with sweets. According to one study, 46% admit to overeating sweet foods when stressed. Suppose that the 46% figure is correct and that a random sample of \( n = 100 \) Americans is selected.

(a) Does the distribution of \( \hat{p} \) have an approximately normal distribution?

Find the mean and mean and std. dev.

\[ \mu = \sigma = \]

(b) What is the probability that the sample proportion \( p \) exceeds .5.

(c) Find the probability that \( p \) lies between .76 and .84.

7.37abcd The average percentage of brown M&M's in a package of M&Ms is 30%. Suppose you randomly select a package of M&Ms with 55 candies and determine the proportion of brown candies.

(a) What is the expected mean and std. dev. of the sample proportion?

\[ \mu = \sigma = \]

(b) What is the probability that the sample proportion of brown candies is less than 20%?

(c) What is the probability that the sample proportion exceeds 35%?

(d) Within what range would you expect the sample proportion to lie about 95% of the time?

Answers

7.27ab (a) \( \mu = 1890 \; \sigma = 69.282 \) (b) .0559

7.29

(a) \( n=100, \; p=.3 \) \( \mu = .3 \; \sigma = .0458 \)

(b) \( n=400, \; p=.1 \) \( \mu = .1 \; \sigma = .015 \)

(c) \( n=250, \; p=.6 \) \( \mu = .6 \; \sigma = .0310 \)

7.33abdfg

(a) \( p = .01 \) \( \sigma_{\hat{p}} = .0099 \)

(b) \( p = .10 \) \( \sigma_{\hat{p}} = .03 \)

(d) \( p = .50 \) \( \sigma_{\hat{p}} = .05 \)

(f) \( p = .90 \) \( \sigma_{\hat{p}} = .03 \)

(g) \( p = .99 \) \( \sigma_{\hat{p}} = .0099 \)

7.35abc (a) yes \( \mu = .46 \; \sigma = .0498 \)

(b) .2119 (c) .9513

7.37abcd

(a) \( \mu = .3 \; \sigma = .0618 \)

(b) .0526 (c) .2090 (d) [.18, .42]