SOLUTIONS TO STATISTICS 8 PRACTICE PROBLEMS FOR CHAPTER 9

Chapter 9: #2, 5, 9, 10, 13, 18, 24ab, 31, 36, 45, 48a, 85cd, 123, 124

9.2 The parameter of interest is the proportion that thinks crime is a serious problem in the population of all adult Americans. The statistic will be the proportion of the 1000 adults in the sample who think crime is a serious problem. The statistic will estimate the unknown value of the parameter.

9.5 **a.** The parameter of interest is the proportion of the population that has as least one copy of the E4 allele for Apo E.
b. A confidence interval would make more sense. There is no obvious null value because there is no "chance" value of interest to test.
c. The scientists could not possibly have measured everyone in the population. They are relying on a sample to estimate the percentage of the population that has the allele.

9.9 **a.** $\hat{p}$ because this is a sample proportion.
b. p because this is a population proportion.
c. $\hat{p}$ because this is a sample proportion.

9.10 **a.** $\overline{x}$ because it is a sample mean.
b. μ because it is the mean for the whole population.

9.13 This is an example of Situation 2 on page 337 of the text.
a. How much difference is there between the proportions with high blood pressure for women who use oral contraceptives versus women who do not?
b. Parameter = $p_1 - p_2$, where p_1= population proportion with high blood pressure for women who use oral contraceptives and p_2= population proportion with high blood pressure for women who do not use oral contraceptives.
c. $\hat{p}_1 - \hat{p}_2 = .15 - .10 = .05$.

9.18 **a.** Paired data. A married couple is a husband-wife pair.
b. Independent samples. Teachers and plumbers are two separate, independent groups.
c. Independent samples. High school and college graduates are separate, independent groups.

9.24 **a.** The mean of the sampling distribution of $\hat{p}$ is p.
b. One value from the sampling distribution of $\hat{p}$ is one sample proportion, denoted by $\hat{p}$.

9.31 **a.** Mean = p = .5; s.d. = $\sqrt{\dfrac{.5(1-.5)}{400}} = .025$

b. Mean = p = .5; s.d. = $\sqrt{\dfrac{.5(1-.5)}{1600}} = .0125$

c. Mean = p = .8; s.d.$(\hat{p})$ = $\sqrt{\dfrac{.8(1-.8)}{64}} = .05$

d. Mean = p = .8; s.d.$(\hat{p})$ = $\sqrt{\dfrac{.8(1-.8)}{256}} = .025$

9.36 **a.** Mean $= p = .2$

b. s.d.$(\hat{p}) = \sqrt{\frac{.2(1-.2)}{64}} = .05$.

c. .15 and .25, calculated as .2 ±.05.

d. .10 and .30, calculated as .2 ± (2×.05).

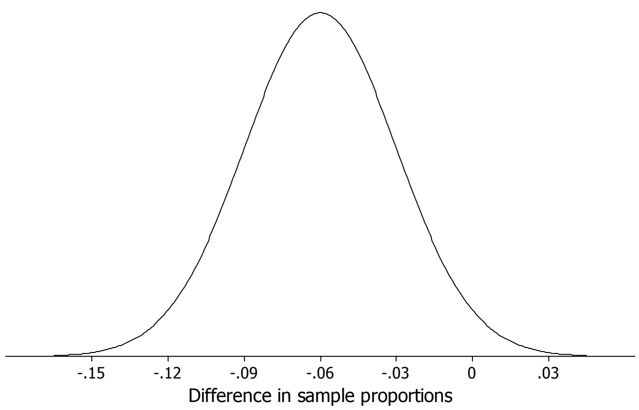
9.45 The mean is $p_1 - p_2$ which is 0 if the two proportions are equal.

9.48 **a.** First, from Exercises 9.46a and 9.47a we find:

The mean is $p_1 - p_2 = .30 - .36 = -0.06$.

The standard deviation is $\sqrt{\frac{p_1(1-p_1)}{n_1} + \frac{p_2(1-p_2)}{n_2}} = \sqrt{\frac{.3(.7)}{500} + \frac{.36(.64)}{500}} = .0297$

So the picture is as follows:

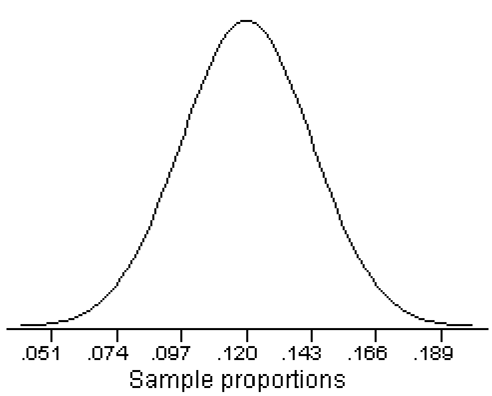


9.85 **c.** $z = \frac{.78-.80}{\sqrt{\frac{.80(1-.80)}{400}}} = \frac{-.02}{.02} = -1$.

d. $z = \frac{.82-.80}{\sqrt{\frac{.80(1-.80)}{400}}} = \frac{.02}{.02} = 1$

9.123 The distribution of possible sample proportions is approximately a normal curve.

The mean = .12 and the standard deviation is $s.d.(\hat{p}) = \sqrt{\frac{p(1-p)}{n}} = \sqrt{\frac{.12(1-.12)}{200}} = .023$



9.124 **a.** The actual population is American adults and a fixed proportion of those adults fell asleep at the wheel in the last year.

b. If p = .4, the mean is .4 and $s.d.(\hat{p}) = \sqrt{\frac{p(1-p)}{n}} = \sqrt{\frac{.4(1-.4)}{1027}} = .0153$ So, by the Empirical Rule, about 95% of all sample proportions should fall between .4 ± (2)(.0153) = .3694 to .4306. Yes, the result of this survey falls into that interval.

c. Yes, it would be reasonable to conclude that the population proportion of college students who have this problem differs from the proportion of adults who have the problem. If the population proportion for college students were .4, the same as for all adults, who have this problem, it would be nearly impossible for the sample proportion to be as low as .25 (25%). With the mean and standard deviation found in part (b), a z-score for .25 is $z = \frac{.25-.40}{.0153} = -9.8$. In a standard normal curve, this is virtually impossible.