Statistics: Chapter 8 Solutions

Lesson 8.1.1

8-1. a. Answers may vary.

b. There is certainly some probability of that split! There were 10 women in the group, so getting 5 women randomly chosen is not impossible, though it might be unlikely.

c. They believe she cheated to favor the women.

8-2. a. Because they are sampling without replacement, the probability of “success” (whether defined as men or women) is not the same every draw; probabilities change as time goes on.

b. Plans may vary. There should be 28 cards, split into two groups, one of size 10 and one of size 18. A simple option might be to use black cards for men and red cards for women or vice versa. To simulate one “draw,” the cards can be shuffled and 8 cards dealt out, with the number of men (black cards) and number of women (red cards) recorded.

8-3. a. Answers likely will range from 0 to 17%. The theoretical probability is about 6%.

b. Answers likely will range from 0 to 20%. The theoretical probability is about 7.7%.

8-4. a. Answers likely will range from 4 to 10%. See theoretical values above.

b. Answers likely will range from 5 to 11%. See theoretical values above.

8-5. a. The answer for part (b) is very close to the *p*-value, since it is as or more extreme.

b. Answers will vary—generally, if the probability calculated in part (b) of problem 8-4 is 5% or less that is considered strong enough evidence to reject the hypothesis, but the 5% number is somewhat arbitrary.

8-6. The Chapter 7 method for evaluation claims using confidence intervals assumed the claims were *numeric* claims about a parameter, so that a confidence interval for the parameter could be evaluated as to whether it contained the claimed value. In this case, there is no such numeric claim.

8-7. a. binomial, 2.6%

b. 3.3%

c. p = long-run proportion of penalty shots made. H_A: $p < 0.8$

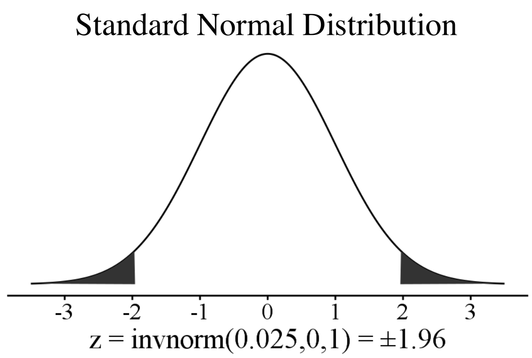
d. The *p*-value is quite low; you can accept the alternative hypothesis. It seems like she probably is no longer shooting at an 80% rate.

8-8. a. Binomial distribution, $n = 10, p = \frac{1}{8}$. $P(X > 2) = 1 - P(X \le 2) = 0.1195$

b. This is the geometric setting. The expected value is the mean = 8 boxes.

c. Geometric distribution, $p = \frac{1}{8}$. $P(X = 12) = 0.0288$

8-9. a. <u>Identify</u>: 95% confidence interval for the proportion of U.S. residents overwhelmed by clutter.
<u>Check conditions</u>: Random selection, to avoid bias: says "SRS" in problem.
Independent trials, for an accurate $\sigma_{\hat{p}}$: 150(10) < U.S. population. Large counts, sampling distribution ≈ normal: $\hat{n}p = 81 > 10$, $n(1 - \hat{p}) = 69 > 10$.
<u>Calculate</u>: SE = $\sqrt{\frac{0.54(0.46)}{150}} \approx 0.04069$, find $z^* = 1.96$ (see sketch below),
MOE = 1.96(0.04069) = 0.0798, confidence interval = 0.54 ± 0.0798, {0.4602, 0.6198}.
<u>Conclude</u>: We are 95% confident that the interval from 0.460 to 0.620 contains the true population proportion of U.S. residents who are overwhelmed by their clutter.



b. $\text{ME} = 2.58\sqrt{\frac{0.78(0.22)}{300}} = 0.0617 \approx 6.2\%$

c. ME = 3%, $0.03 = z^*\sqrt{\frac{0.54(0.46)}{600}}$, $z^* = 1.474$,
CI = 1.00 – 2(normalcdf(1.474, 10^99, 0, 1)) = 0.86 or 86% confidence

d. ME = $3\% > 1.645\sqrt{\frac{0.78(0.22)}{n}}$. Solve this inequality to get $n > 515.95$, so need a minimum of 516 people.

