SOLUTIONS TO STATISTICS 8 PRACTICE PROBLEMS FOR CHAPTER 8

Chapter 8: #3, 10, 20, 31, 34, 35, 40, 48b, 55ab, 57, 66, 67b

8.3 **a.** Discrete
b. Continuous
c. Continuous
d. Discrete

8.10 **a.** .80. Find this by adding the probabilities for $X = 0$, 1, and 2.
$P(X \leq 2) = P(X = 0) + P(X=1) + P(X=2) = .14 + .27 + .39 = .80$.
b. $P(X = 1 \text{ or } X = 2) = .37 + .29 = .66$.
c. $P(X > 0) = 1 - P(X = 0) = 1 - .14 = .86$. This can also be found be adding probabilities for X = 1, 2, and 3.
d.

k	0	1	2	3	4
$P(X \leq k)$	.14	.51	.80	.95	1

8.20 $E(X) = (\$100)(.01) + (-\$5)(.99) = -\$3.95$.

8.31 **a.** $\mu = E(X) = \sum xp(x) = (15\times.8) + (20\times.2) = 16$ minutes.
b. No, the expected value will never be your actual commute time (which is always either 15 min. or 20 min.)

8.34 **a.** $n = 30$ and $p = 1/6$.
b. $n = 10$ and $p = 1/100$.
c. $n = 20$ and $p = 3/10$.

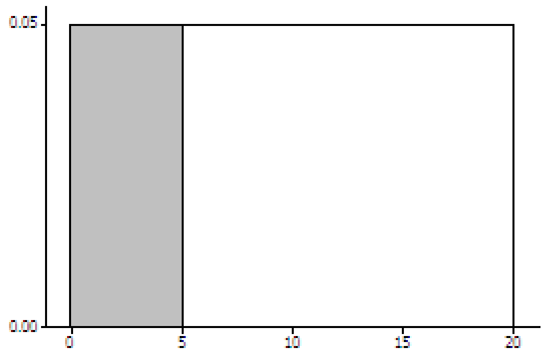
8.35 **a.** $\mu = E(X) = np = (30)(1/6) = 5$.
b. $\mu = E(X) = np = (10)(1/100) = 0.10$.
c. $\mu = E(X) = np = (20)(3/10) = 6$.

8.40 **a.** The number of trials is specified in advance. There are two possible outcomes—either the subject guesses correctly or not. If the subject merely guesses, the probability of success remains the same from trial to trial. Whether a subject guesses correctly or not on a trial is independent from the results of previous trials.
b. Yes, X is a binomial random variable with $n = 10$ and $p = .25$.
c. The number correct is either 6 or more or 5 or less, so $P(X\geq 6) = 1 - P(X\leq 5) = 1 - .9803 = .0197$.
d. With $p = .5$, $P(X\geq 6) = 1 - P(X\leq 5) = 1 - .6230 = .3770$.
e. This answer will vary. A factor to consider is that among all people who merely guess, .0197(about 2%) will be able to get 6 or more correct. If many people are tested, a few who just guess will be able to get 6 or more right. Another factor to consider is the possible proportion in the population that actually has psychic ability. If few people have psychic ability, a result of 6 or more correct might reasonably be considered to have been

the result of lucky guessing. If many people actually have psychic ability, it might be reasonable to think the result was obtained from one of those with psychic ability.

8.48 **b.** The rectangle has height =1/20=0.05 because the range of X is 20 − 0 = 20.

Figure for Exercise 8.48b



8.55 **a.** $z = \frac{71-75}{8} = -0.5$. So, $P(X \le 71) = P(Z \le -0.5) = .3085$.

b. $z = \frac{85-75}{8} = 1.25$. So, $P(X \ge 85) = P(Z \ge 1.25) = 1 - P(Z < 1.25) = 1 - .8984 = .1016$.

Equivalently, $P(Z > 1.25) = P(Z < -1.25) = .1016$.

8.57 **a.** $z^* = -1.96$. If using Table A.1, look for .025 within the interior part of the table.
b. $z^* = 1.96$. If using Table A.1, look for .975 within the interior part of the table. Or, note that the area to the right of z^* must be .025, so by the symmetry of the standard normal curve the answer is the positive version of the answer for part (a).
c. $z^* = 1.96$ because if .95 is in the central area, .975 must be the area to the left of z^*. This means the answer is the same as for part (b).

8.66 **a.** Answer = .0571. For a binomial random variable with $n = 50$ and $p = .512$,

$\mu = np = 50(.512) = 25.6$, and $\sigma = \sqrt{50(.512)(1-.512)} = 3.535$.

Thus, for $X = 20$, $z = \frac{20-25.6}{3.535} = -1.58$.

$P(X \le 20) \approx P(Z \le -1.58) = .0571$.

b. Answer = .0749. With the continuity correction, we find $P(X \le 20.5)$.

For $X = 20.5$, $z = \frac{20.5-25.6}{3.535} = -1.44$. So, $P(X \le 20.5) = P(Z \le -1.44) = .0749$.

8.67 **b.** Answer = .0039. For a binomial random variable with $n = 2000$ and $p = .87$,

$\mu = np = 2000(.87) = 1740$, and $\sigma = \sqrt{2000(.87)(1-.87)} = 15.04$.

For $X = 1700$, $z = \frac{1700-1740}{15.04} = -2.66$. $P(Z \le -2.66) = .0039$.