Solutions to Ch. 6 review

1. c # of goals is discrete (no decimals)

2. b, $\sqrt{6^2+9^2}=10.8$

3. e, mean = 2(6) + 8, standard deviation = $\sqrt{(2(0.5))^2+0.6^2}=1.17$

4. d, .20 + .11 + .05 + .03 = .39

5. c, 0(.24) + 1(.37) + 2(.20) + 3(.11) + 4(.05) + 5(.03) = 1.45 or use your calculator with the data in two lists, use 1-variable stats and make your probabilities your frequency list.

6. c, choices a and b violate a condition of binomial, d is incorrect because the n is not large enough for the normal approximation.

7. d, use your calculator with the data in two lists, use 1-variable stats and make your probabilities your frequency list or use the formula.

8. b, 4C + 2C = .9 (since all the probabilities must add up to 1), 6C = .9, C = .15

9. d, when adding random variables you always add variances but your random variables must be independent of each other.

10. d, $\mu = np = 18(.90) = 16.2$, $\sigma=\sqrt{np(1-p)}=\sqrt{18(.90)(.10}=1.273$

11. b, because you pay \$10 for a ticket the probability distribution is

C	\$-10	\$490	\$990	\$1990
P(C)	0.60	0.05	0.13	0.22

The expected profit is (-10)(.60) + (490)(.05) + (990)(.13) + (1990)(.22) = \$585

12. c, You are looking for the x-value with .6 area under the normal curve to the left. You either use InvNorm on your calculator or look up the z-score (z = .25) and solve $.25=\frac{x-240}{60}$ for x.

13. a. .1, all the probabilities must add to one
b. .3, add up P(1) + P(2)
c. 3.1, use your calculator and 1-variable stats with the probabilities as frequency list or use the formula (1(.1) + 2(.2) + 3(.3) + 4(.3) + 5(.1))
d. 1.2905, square your standard deviation from e
e. 1.136, use your calculator and 1-variable stats with the probabilities as frequency list or use the formula
f. 6.2, Add the mean from c twice, 3.1 + 3.1
g. 1.60655, use variance from d, $\sqrt{1.2905+1.2905}$

14. $-1.06, The probability distribution

X	-3 (lose $3)	17 (win $20)	2 (win $5)
P(X)	28/36	2/36	6/36

is

Expectation = (-3)(28/36) + (17)(2/36)+ (2)(6/36)

15. a. Check that the area under the curve is 1, using rectangles, a square and a triangle. I used a rectangle from 0 to 2, a square and triangle (on top of each other) from 2 to 3 and a rectangle from 3 to 5

$.3(2) + .1(1) + .5(1)(.2) + 2(.1) = 1$

b. .8, find area under the curve from 0 to 3 $.3(2) + 1(.1) + .5(1)(.2)$

c. .2, find area under the curve from 2 to 3 $1(.1) + .5(1)(.2)$

16. a. X is a binomial distribution with n = 20 and p = .02, because the four conditions are satisfied:

* there are two outcomes (success = defective, failure = not defective)
* there is fixed number of trials: n = 20 trials
* trials are independent: there is random selection (assume selecting with replacement)
* the probability that a randomly selected toaster is defective is the same for each trial

b. 0.2725 Use binomialpdf or $_{20}C_1(.02)^1(.98)^{19}$

c. X = number of defective toasters, $\mu = 20(.02) = 0.4$, $\sigma = \sqrt{20(.02)(.98)} = 0.626$

d. P(0) + P(1) + P(2) = 0.9929 Use the formula or binomialcdf

17. X is not binomial because the number of trials are not fixed.

18. X is Binomial because the four conditions are satisfied. (The 10% condition is satisfied, even though we are sampling without replacement, we can say the independence condition is satisfied)

19. X is Binomial because the four conditions are satisfied.

20. a. 0.015 Use the binomialpdf or $_{20}C_{15}(.5)^{15}(.5)^5$

b. 0.0207 Use binomialcdf or calculate P(15) + P(16) + …P(20)

c. $\mu = 20(.5) = 10$, $\sigma = \sqrt{20(.5)(.5)} = 2.236$

d. 0.9586 Can use normal approximation because $np \geq 10$ and $n(1-p) \geq 10$ AND p = .5 and find $P(5.528 < X < 14.472)$ or use binomialcdf

21a. X = Number of patients whose headaches are cured.

b. X is Binomial with n=100, p =0.8

c. $\mu = 100(.8) = 80$, $\sigma = \sqrt{100(.80)(.20)} = 4$

d. .68, Since the sample size is large enough $np \geq 10$ and $n(1 - p) \geq 10$ I can use empirical rule.

e. .95 Same reason as d
f. The 68 –95-99.7 (empirical) rule will work because the sample size is large enough to use the normal approximation. (see c)

22. a. $\mu_r = 1, \sigma_r = 1$ use your calculator and 1-variable stats with the probabilities as frequency list or use the formula.
After randomly selecting many mp3 players the mean number of repairs is 1.
Typically, the number of repairs to an mp3 player is 1 repair away from the mean of 1 repair.

b. Let P represent the phone repairs, $\mu_{r+p} = 1 + 2 = 3, \sigma_{r+p} = \sqrt{1^2 + 1.2^2} = 1.562$
After randomly selecting many mp3 players and phones, the mean number of repairs is 3.
Typically, the number of repairs to an mp3 player and phone together is 1.562 repairs away from a mean of 3 repairs.

c. $15\mu_r = 15, \quad 15\sigma_r = 15, \quad 25\mu_p = 50, \quad 25\sigma_p = 30$ so $\mu_{15r+25p} = 15 + 50 = 65, \quad \sigma_{15r+25p} = \sqrt{15^2 + 30^2} = 33.54$

23. If you subtract Mr. Cull from Mr. Voss you want to look at the area under the normal curve greater than 0, this means Mr. Voss did better than Mr. Cull

$\mu_{v-c} = 212 - 230 = -18, \quad \sigma_{v-c} = \sqrt{31^2 + 40^2} = 50.6$
P(V – C > 0) = .36 Use normalcdf or compute the z-score (.36) and look in the table (.6406), you will need to subtract the number from the table from 1 (1 - .6406) in order to get the area to the right.

24. c, geometric probability focusses on when you get your first success.

25. e, turning over the cards is not independent.

26. d, this is the difference between binomial and geometric

27. b, geometric with p = .8 and x = 5

28. b, mean (expected number) of geometric probability is 1/p

29. d, geometric with p = .4 and x = 1, 2, 3, 4

30. d, mean (expected number) of geometric probability is 1/p

31. a, geometric with p = .6 with x = 1, 2, 3

32. c, mean (expected number) of geometric probability is 1/p

33. d, mean (expected number) of geometric probability is 1/p

34. b, geometric with p = .16 and x = 1 – 10. Then 1 - .8251. (.8251 is probability that you find someone with jumper cables by the 10^{th} person)

35. b, II is false because the shape of the binomial when p = .9 depends on the number of trials.