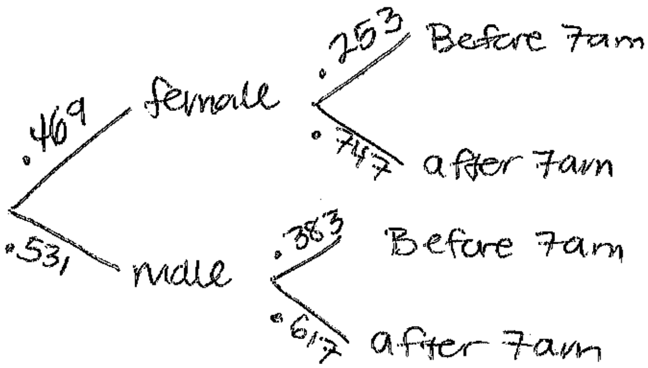
Ch. 5 and 6 Extra Practice Key

1. p = .05, find P(X greater than or equal to 1) = 1 - P(X = 0) = 1 – [$(.95)^{90}$] = 1 - .0099 = .9901
   There is about 99% chance that at least one student will come to school on Thursday without a graphing calculator, on average.

2. a.



   b. P(male and before 7) = P(before 7 | male) P(male) = (.383)(.531) = .2034

   c. P(before 7) = P(before 7 | male) P(male) + P(before 7 | female) P(female) = .2034 + (.253)(.469) = .203373 + .118657 = .32203

   d. P(female | before 7) = P(female and before 7) / P(before 7) = (.253)(.469) / (.32203) = .3685

3. a. Let X = number of red M+Ms
   all probabilities are between 0 and 1.
   .02 + .04 + .04 + .1 + .17 + .4 + .16 + .05 + .02 = 1.
   Let Y = number of blue M+Ms
   All probabilities are between 0 and 1.
   .01 + .02 + .04 + .06 + .12 + .35 + .35 + .04 + .01 = 1.

   b. P(X greater than 3) = .17 + .4 + .16 + .05 + .02 = .8

   c. P(Y is between 2 and 6) = .04 + .06 + .12 + .35 + .35 = .92

   d. P(X+Y=8)

X + Y = 8	0 + 8	8 + 0	1+7	7+1	2+6	6+2	3+5	5+3	4+4
P (X +Y = 8)	(.02)(.01)	(.02)(.01)	(.04)(.04)	(.05)(.02)	(.04)(.35)	(.16)(.04)	(.1)(.35)	(.4)(.06)	(.17)(.12)

   .0002 + .0002 + .0016 + .001 + .014 + .0064 + .035 + .024 + .0204 = .1028

   e. $\mu_X = 4.57$ Red M+Ms
   $\sigma_X = 1.557$ Red M+Ms
   $\mu_Y = 4.97$ Blue M+Ms
   $\sigma_Y = 1.374$ Blue M+Ms

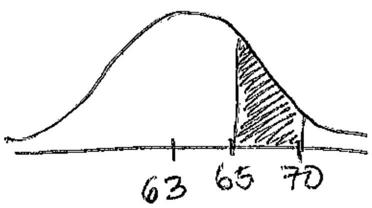
   f. Let R = total cost of red M+Ms, where R = .05X. Let B = total cost of Blue M+Ms, where B = .07Y.
   $\mu_R = \$.23$, and $\mu_B = \$.35$

4. a. Let T = total travel time, where X = walk time alone and Y = walk time with sisters.
   So $\mu_T = \mu_X + \mu_Y$ = 28 + 35 = 63 minutes

   b. $\sigma_T^2 = \sigma_X^2 + \sigma_Y^2$ = (3.4)^2 + (6.1)^2 = 48.77, so σ_T = 6.984 minutes

   c. Let D = Difference in travel times.
   So $\mu_D = \mu_X - \mu_Y$ = 28 - 35 = -7 minutes
   $\sigma_D^2 = \sigma_X^2 + \sigma_Y^2$ = (3.4)^2 + (6.1)^2 = 48.77, so σ_D = 6.984 minutes.

   d. $P(65 \leq T \leq 70)$, where $N_X(28, 3.4)$ and $N_Y(35, 6.1)$ so $N_T(63, 6.984)$



$$z = \frac{65-63}{6.984} = .29 \xrightarrow{\text{z-table}} .6141$$

$$z = \frac{70-63}{6.984} = 1.00 \xrightarrow{\text{z-table}} .8413$$

$$.8413 - .6141 = \boxed{.2272}$$

   There is about a 22.72% chance that Mrs. Hall's total travel time will be between 65 and 70 minutes, on average.

5. a. Binary – "success" = went to math class for tutorial
   Independent – 30 students is less than 10% of the Leland population, students should be choosing tutorial location independently of what their friends/peers choose. ☺
   Fixed Trials – 30 randomly selected students.
   Same probability – probability of student going to math during tutorial = .3
   Binomial setting, where X = number of students that go to math for tutorial when n = 30 and p=.3

   b. P(X = 13) = $_{30}C_{13}$ (.3)^{13}(.7)^{17} = .0444

   c. $P(X \leq 8) =$ .4315

6. a. Binary – "success" = basket made.
   Independent – each toss should be independent of each other.
   Trials – toss paper until success
   Same Probability – prob. of basket made = .3
   Geometric Setting, where T = number of tosses until success with p = .3.

   b. P(T = 4) = (.3)(.7)^3 = .1029. There is about a 10.29% chance that they will make the basket on the 4th toss for the first time.

   c. $P(T \leq 4) =$ .7599

   d. $\mu_T = {}^{1}/_{.3}$ = 3.33 tosses.