39. a. 0.000854 b. 0.0000610 c. 0.000916
    d. Yes. The probability of getting 13 girls or a result that is more extreme is 0.000916, so chance does not appear to be a reasonable explanation for the result of 13 girls. Because 13 is an unusually high number of girls, it appears that the probability of a girl is higher with the XSORT method, and it appears that the XSORT method is effective.
41. 0.134. It is not unlikely for such a combined sample to test positive.
43. 0.662. The probability shows that about 2/3 of all shipments will be accepted. With about 1/3 of the shipments rejected, the supplier would be wise to improve quality.
45. 0.0468
47. a. 0.000969 b. 0.0000000715 c. 0.436

Section 5-4

1. $n = 270$, $p = 0.07$, $q = 0.93$
3. 9.4 executives^2 (or 9.6 executives^2 if the rounded standard deviation of 3.1 executives is used)
5. $\mu = 12.0$ correct guesses; $\sigma = 3.1$ correct guesses; minimum $= 5.8$ correct guesses; maximum $= 18.2$ correct guesses.
7. $\mu = 668.6$ worriers; $\sigma = 15.1$ worriers; minimum $= 638.4$ worriers; maximum $= 698.8$ worriers.
9. a. $\mu = 145.5$; $\sigma = 8.5$
   b. Yes. Using the range rule of thumb, the minimum usual value is 128.5 boys and the maximum usual value is 162.5 boys. Because 239 boys is above the range of usual values, it is unusually high. Because 239 boys is unusually high, it does appear that the YSORT method of gender selection is effective.
11. a. $\mu = 20.0$, $\sigma = 4.0$
    b. No, because 25 orange M&Ms is within the range of usual values (12 to 28). The claimed rate of 20% does not necessarily appear to be wrong, because that rate will usually result in 12 to 28 orange M&Ms (among 100), and the observed number of orange M&Ms is within that range.
13. a. $\mu = 142.8$, $\sigma = 11.9$
    b. No, 135 is not unusually low or high because it is within the range of usual values (119.0 to 166.6).
    c. Based on the given results, cell phones do not pose a health hazard that increases the likelihood of cancer of the brain or nervous system.
15. a. $\mu = 156.0$; $\sigma = 12.1$
    b. The minimum usual frequency is 131.8 and the maximum is 180.2. The occurrence of r 178 times is not unusually low or high because it is within the range of usual values (131.8 to 180.2).
17. a. $\mu = 74.0$; $\sigma = 7.7$
    b. The minimum usual number is 58.6 and the maximum usual value is 89.4. The value of 90 is unusually high because it is above the range of usual values (58.6 to 89.4).
19. a. $\mu = 0.0821918$; $\sigma = 0.2862981$
    b. The minimum usual number is -0.4904044 and the maximum usual number is 0.654788. The results of 2 students born on the 4th of July would be unusually high, because 2 is above of the range of usual values (from -0.4904044 to 0.654788).
21. $n = 150$; $p = 0.4$, so that 40% of the surveyed subjects could identify at least one member of the Supreme Court; $q = 0.6$, so that 60% of surveyed subjects could not identify at least one member of the Supreme Court.
23. $\mu = 3.0$ and $\sigma = 1.3$ (not 1.5)

Section 5-5

1. $\mu = 535/576 = 0.929$, which is the mean number of hits per region. $x = 2$, because we want the probability that a randomly selected region had exactly 2 hits, and $e \approx 2.71828$, which is a constant used in all applications of Formula 5-9.
3. With $n = 50$, the first requirement of $n \geq 100$ is not satisfied. With $n = 50$ and $p = 1/1000$, the second requirement of $np \leq 10$ is satisfied. Because both requirements are not satisfied, we should not use the Poisson distribution as an approximation to the binomial.
5. 0.000203; yes 7. 0.110; no
9. a. 6.5 b. 0.998 (Tech: 0.999)
   c. Yes. Based on the result in part (b), we are quite sure (with probability 0.998) that there is at least one earthquake measuring 6.0 or higher on the Richter scale, so there is a very low probability (0.002) that there will be no such earthquakes in a year.
11. a. 62.2
    b. 0.0155 (0.0156 using rounded mean)
13. a. 0.170
    b. The expected number is between 97.9 and and 98.2, depending on rounding.
    c. The expected number of regions with 2 hits is close to 93, which is the actual number of regions with 2 hits.
15. a. $P(26) = 0.0558$. Expected number: 1.9 cookies. The expected number of cookies is 1.9, and that is very close to the actual number of cookies with 26 chocolate chips, which is 2.
    b. $P(30) = 0.0724$. Expected number: 2.5 cookies. The expected number of cookies is 2.5, and that is very different from the actual number of cookies with 26 chocolate chips, which is 6.
17. a. No. With $n = 12$ and $p = 1/6$, the requirement of $n \geq 100$ is not satisfied, so the Poisson distribution is not a good approximation to the binomial distribution.
    b. No. The Poisson distribution approximation to the binomial distribution yields $P(3) = 0.180$, but the binomial distribution yields the correct result of $P(3) = 0.197$. The Poisson approximation of 0.180 is too far from the correct result of 0.197.

Chapter 5: Quick Quiz

1. Yes 2. 20.0 3. 4.0
4. Yes 5. No
6. Yes. (The sum of the probabilities is 0.999 and it can be considered to be 1 because of rounding errors.)
7. 0+ indicates that the probability is a very small positive number. It does not indicate that it is impossible for none of the five flights to arrive on time.
8. 0.945 9. Yes 10. No