Section 5-2

3. Table 5-7 does describe a probability distribution because the three requirements are satisfied. First, the variable x is a numerical random variable and its values are associated with probabilities. Second, $\Sigma P(x) = 0.125 + 0.375 + 0.375 + 0.125 = 1$ as required. Third, each of the probabilities is between 0 and 1 inclusive, as required.

8. Probability distribution with
$\mu = (0 \cdot 0.659) + (1 \cdot 0.287) + (2 \cdot 0.05) + (3 \cdot 0.004) + (4 \cdot 0.001) + (5 \cdot 0) = 0.4$
$\sigma = \sqrt{(0-0.4)^2 \cdot 0.659 + (1-0.4)^2 \cdot 0.287 + (2-0.4)^2 \cdot 0.05 + ... + (4-0.4)^2 \cdot 0.001 + (5-0.4)^2 \cdot 0}$
$= 0.6$

11. Probability distribution with
$\mu = (0 \cdot 0.041) + (1 \cdot 0.2) + (2 \cdot 0.367) + (3 \cdot 0.299) + (4 \cdot 0.092) = 2.2$
$\sigma = \sqrt{(0-2.2)^2 \cdot 0.041 + (1-2.2)^2 \cdot 0.2 + (2-2.2)^2 \cdot 0.367 + (3-2.2)^2 \cdot 0.299 + (4-2.2)^2 \cdot 0.092} = 1$

13. Not a probability distribution because the responses are not values of a numerical random variable. Also, sum of the probabilities is 1.18 instead of 1 as required.

Section 5-3

5. Not binomial. Each of the weights has more than two possible outcomes.

6. Binomial

7. Binomial

8. Not binomial. Each of the responses has more than two possible outcomes.

13. a. $\frac{4}{5} \cdot \frac{4}{5} \cdot \frac{1}{5} = 0.128$

b. {*WWC*, *WCW*, *CWW*}; 0.128 for each

c. $0.128 \cdot 3 = 0.384$

15. ${}_5C_3 \cdot 0.2^3 \cdot 0.8^2 = 0.051$

16. ${}_5C_3 \cdot 0.2^3 \cdot 0.8^2 + {}_5C_4 \cdot 0.2^4 \cdot 0.8^1 + {}_5C_5 \cdot 0.2^5 \cdot 0.8^0 = 0.057$

17. ${}_5C_3 \cdot 0.2^3 \cdot 0.8^2 + {}_5C_4 \cdot 0.2^4 \cdot 0.8^1 + {}_5C_5 \cdot 0.2^5 \cdot 0.8^0 = 0.057$

19. ${}_5C_5 \cdot 0.2^0 \cdot 0.8^5 = 0.328$

32. a. ${}_8C_8 \cdot 0.90^8 \cdot 0.10^0 = 0.430$

b. ${}_8C_7 \cdot 0.90^7 \cdot 0.10^1 = 0.383$

c. $0.43 + 0.383 = 0.813$

d. No, the probability from part (c) is not small, so 7 is not unusually high

Section 5-4

7. $\mu = np = 1013 \cdot 0.66 = 668.6$ worriers and $\sigma = \sqrt{np(1-p)} = \sqrt{1013 \cdot 0.66 \cdot 0.34} = 15.1$ worriers. Minimum: $668.6 - 2(15.1) = 638.4$ worriers, maximum: $668.6 + 2(15.1) = 698.8$ worriers

13. a. $\mu = np = 420{,}095 \cdot 0.00034 = 142.8$ and $\sigma = \sqrt{np(1-p)} = \sqrt{420{,}095 \cdot 0.00034 \cdot 0.999666} = 11.9$

b. No, 135 is not unusually low or high because it is within the range of usual values $142.8 - 2(11.9) = 119$ and $142.8 + 2(11.9) = 166.6$

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.

14. a. $\mu = np = 280 \cdot 0.5 = 140$ and $\sigma = \sqrt{np(1-p)} = \sqrt{280 \cdot 0.5 \cdot 0.5} = 8.4$

b. The result of 123 correct identifications is just outside the range of usual values of $140 - 2(8.4) = 123.2$ and $140 + 2(8.4) = 156.8$, but this indicates that 123 is unusually low. If the touch therapists really had an ability to select the correct hand, they would have made more than 156.8 correct identifications. Therefore, they do not appear to have that ability.

18. a. $\mu = np = 50 \cdot \frac{1}{38} = 1.3$ and $\sigma = \sqrt{np(1-p)} = \sqrt{50 \cdot \frac{1}{38} \cdot \frac{37}{38}} = 1.1$

b. The minimum usual value is $1.3 - 2(1.1) = -0.9$ and the maximum is $1.3 + 2(1.1) = 3.5$
The result of 0 wins is not unusually low because 0 wins is within the range of usual values.

Section 5-5

6. $P(6) = \frac{8.5^6 \cdot e^{-8.5}}{6!} = 0.107$; No it is not unlikely