

23.  $44/134$ , or 0.328  
 25. a.  $1/3$ , or 0.333  
     b. 0.5  
 27. 0.5  
 29. a. 0.9996      b. 0.999992  
 31. 0.684. The probability is not low, so further testing of the individual samples will be necessary for about 68% of the combined samples.  
 33. a. 0.431      b. 0.569  
 35. a. 0.0748      b. 0.8  
     c. The estimate of 75% is dramatically greater than the actual rate of 7.48%. They exhibited confusion of the inverse. A consequence is that they would unnecessarily alarm patients who are benign, and they might start treatments that are not necessary.

## Section 4-6

1. The symbol  $!$  is the factorial symbol that represents the product of decreasing whole numbers, as in  $4! = 4 \cdot 3 \cdot 2 \cdot 1 = 24$ . Four people can stand in line 24 different ways.  
 3. Because repetition is allowed, numbers are selected *with replacement*, so neither of the two permutation rules applies. The fundamental counting rule can be used to show that the number of possible outcomes is  $10 \cdot 10 \cdot 10 \cdot 10 = 10,000$ , so the probability of winning is  $1/10,000$ .  
 5.  $1/10,000$   
 7.  $1/362,880$   
 9. 17,383,860. Because that number is so large, it is not practical to make a different CD for each possible combination.  
 11.  $1/5,527,200$ . No, 5,527,200 is too many possibilities to list.  
 13. 34,650  
 15.  $1/7,059,052$   
 17.  $1/24$   
 19. a.  $1/749,398$       b.  $1/10,000$       c. \$10,000  
 21. a. 11,880      b. 495      c.  $1/495$   
 23. 125,000. The fundamental counting rule can be used. The different possible codes are ordered sequences of numbers, not combinations, so the name of "combination lock" is not appropriate. Given that "fundamental counting rule lock" is a bit awkward, a better name would be something like "number lock."  
 25. 120; AMITY;  $1/120$   
 27. 26      29. 10      31. 64  
 33.  $1/195,249,054$   
 35.  $2/252$ , or  $1/128$ . Yes, if everyone treated is of one sex while everyone in the placebo group is of the opposite sex, you would not know if different reactions are due to the treatment or sex.  
 37. 2,095,681,645,538 (about 2 trillion)  
 39. 12

## Chapter 4: Quick Quiz

1. 0      2. 0.7      3. 1      4. 0.04  
 5. Answer varies, but an answer such as 0.01 or lower is reasonable.  
 6.  $512/839$ , or 0.610  
 7.  $713/839$ , or 0.850  
 8.  $126/839$ , or 0.150  
 9. 0.0224 (not 0.0226)  
 10.  $126/350$ , or 0.360

## Chapter 4: Review Exercises

1. 0.438      2. 0.410      3. 0.806  
 4. It appears that you have a substantially better chance of avoiding prison if you enter a guilty plea.  
 5. 0.986      6. 0.191      7. 0.00484  
 8. 0.619      9. 0.381      10. 0.0136  
 11. Answer varies, but DuPont data show that about 8% of cars are red, so any estimate between 0.01 and 0.2 would be reasonable.  
 12. a. 0.65  
     b. 0.0150  
     c. Yes, because the probability is so small (0.0150).  
 13. a.  $1/365$   
     b.  $31/365$   
     c. Answer varies, but it is probably small, such as 0.02.  
     d. Yes  
 14. 0.0211. No.      15.  $1/5,245,786$   
 16.  $1/575,757$       17.  $1/1000$   
 18. 1320;  $1/1320$

## Chapter 4: Cumulative Review Exercises

1. a. The mean of  $-8.9$  years is not close to the value of 0 years that would be expected with no gender discrepancy.  
 b. The median of  $-13.5$  years is not close to the value of 0 years that would be expected with no gender discrepancy.  
 c.  $s = 10.6$  years  
 d.  $s^2 = 113.2$  years<sup>2</sup>  
 e.  $Q_1 = -15.0$  years  
 f.  $Q_3 = -5.0$  years  
 g. The boxplot suggests that the data have a distribution that is skewed.



2. a. No. The pulse rate of 100 beats per minute is within 2 standard deviations of the mean, so it is not unusual.  
 b. Yes. The pulse rate of 50 beats per minute is more than 2 standard deviations away from the mean, so it is unusual.  
 c. Yes, because the probability of  $1/256$  (or 0.00391) is so small.  
 d. No, because the probability of  $1/8$  (or 0.125) is not very small.  
 3. a. 46%      b. 0.460      c. Stratified sample  
 4. The graph is misleading because the vertical scale does not start at 0. The vertical scale starts at the frequency of 500 instead of 0, so the difference between the two response rates is exaggerated. The graph incorrectly makes it appear that "no" responses occurred about 60 times more often than the number of "yes" responses, but comparison of the actual frequencies shows that the "no" responses occurred about four times more often than the number of "yes" responses.  
 5. a. Convenience sample  
     b. If the students at the college are mostly from a surrounding region that includes a large proportion of one ethnic group, the results will not reflect the general population of the United States.  
     c. 0.75      d. 0.64