33. 0.00985. It is unlikely.
35. 0.00993. Yes, it is unlikely. The middle seat lacks an outside view, easy access to the aisle, and a passenger in the middle seat has passengers on both sides instead of on one side only.
37. 3/8, or 0.375
39. {bb, bg, gb, gg}; 1/2, or 0.5.
41. a. brown/brown, brown/blue, blue/brown, blue/blue
    b. 1/4 c. 3/4
43. a. 999:1 b. 499:1
    c. The description is not accurate. The odds against winning are 999:1 and the odds in favor are 1:999, not 1:1000.
45. a. $16 b. 8:1 c. About 9.75:1, which becomes 39:4
    d. $21.50
47. Relative risk: 0.939; odds ratio: 0.938; the probability of a headache with Nasonex (0.0124) is slightly less than the probability of a headache with the placebo (0.0132), so Nasonex does not appear to pose a risk of headaches.
49. 1/4

Section 4-3

1. Based on the rule of complements, the sum of $P(A)$ and $P(\overline{A})$ must always be 1, so that sum cannot be 0.5.
3. Because it is possible to select someone who is a male and a Republican, events M and R are not disjoint. Both events can occur at the same time when someone is randomly selected.
5. Disjoint. 7. Not disjoint. 9. Disjoint.
11. Not disjoint. 13. 0.53
15. $P(\overline{D}) = 0.450$, where $P(\overline{D})$ is the probability of randomly selecting someone who does not choose a direct in-person encounter as the most fun way to flirt.
17. 1 19. 0.956
21. 13/28, or 0.464. That probability is not as high as it should be.
23. 16/28 or 4/7 or 0.571
25. a. 0.786 b. 0.143
    c. The physicians given the labels with concentrations appear to have done much better. The results suggest that labels described as concentrations are much better than labels described as ratios.
27. 156/1205 = 0.129. Yes. A high refusal rate results in a sample that is not necessarily representative of the population, because those who refuse may well constitute a particular group with opinions different from others.
29. 1060/1205 = 0.880
31. 1102/1205 = 0.915
33. a. 300 b. 178 c. 178/300 = 0.593
35. 0.603
37. 27/300 = 0.090. With an error rate of 0.090 (or 9%), the test does not appear to be highly accurate.
39. 3/4, or 0.75
41. $P(A \text{ or } B) = P(A) + P(B) - 2P(A \text{ and } B)$
43. a. $1 - P(A) - P(B) + P(A \text{ and } B)$
    b. $1 - P(A \text{ and } B)$
    c. No

Section 4-4

1. The probability that the second selected senator is a Democrat given that the first selected senator was a Republican.
3. False. The events are dependent because the radio and air conditioner are both powered by the same electrical system. If you find that your car's radio does not work, there is a greater probability that the air conditioner will also not work.
5. a. Dependent b. 1/132, or 0.00758
7. a. Independent b. 1/12, or 0.0833
9. a. Independent b. 0.000507
11. a. Dependent b. 0.00586
13. a. 0.0081. Yes, it is unlikely.
    b. 0.00802. Yes, it is unlikely.
15. a. 0.739. No, it is not unlikely.
    b. 0.739. No, it is not unlikely.
17. 0.838. No, the entire batch consists of malfunctioning pacemakers.
19. a. 0.02 b. 0.0004 c. 0.000008
    d. By using one backup drive, the probability of failure is 0.02, and with three independent disk drives, the probability drops to 0.000008. By changing from one drive to three, the likelihood of failure drops from 1 chance in 50 to only 1 chance in 125,000, and that is a very substantial improvement in reliability. Back up your data!
21. a. 1/365, or 0.00274
    b. 0.00000751
    c. 1/365, or 0.00274
23. 0.828. No, it is not unlikely.
25. 0.000454. Yes, it is unlikely.
27. a. 0.900
    b. 0.00513 (using the 5% guideline for cumbersome calculations).
29. a. 0.143 (not 0.144)
    b. 0.00848 (using the 5% guideline for cumbersome calculations).
31. a. 0.9999 b. 0.9801
    c. The series arrangement provides better protection.

Section 4-5

1. a. Answer varies, but 0.98 is a reasonable estimate.
   b. Answer varies, but 0.999 is a reasonable estimate.
3. The probability that the polygraph indicates lying given that the subject is actually telling the truth.
5. At least one of the five children is a boy. 31/32, or 0.969.
7. None of the digits is 0; 0.656.
9. 0.893. The chance of passing is reasonably good.
11. 0.5 13. 0.965
15. 0.122. Given that the three cars are in the same family, they are not randomly selected and there is a good chance that the family members have similar driving habits, so the probability might not be accurate.
17. 0.988. It is very possible that the result is not valid because it is based on data from a voluntary response survey.
19. 90/950, or 0.0947. This is the probability of the test making it appear that the subject uses drugs when the subject is not a drug user.
21. 6/866, or 0.00693. This result is substantially different from the result found in Exercise 20. The probabilities P(subject uses drugs | negative test result) and P(negative test result | subject uses drugs) are not equal.