

HW 3-1 (Due Sep. 13, 2016)

Name:

Print then work on it directly. Staple HW 3-1 and 3-2 together.

Problem 1

- 2.124** A population of voters contains 40% Republicans and 60% Democrats. It is reported that 30% of the Republicans and 70% of the Democrats favor an election issue. A person chosen at random from this population is found to favor the issue in question. Find the conditional probability that this person is a Democrat.

Problem 2

- 2.131** The *symmetric difference* between two events A and B is the set of all sample points that are in *exactly one* of the sets and is often denoted $A \Delta B$. Note that $A \Delta B = (A \cap \overline{B}) \cup (\overline{A} \cap B)$. Prove that $P(A \Delta B) = P(A) + P(B) - 2P(A \cap B)$.

Problem 3

- 2.135** Of the travelers arriving at a small airport, 60% fly on major airlines, 30% fly on privately owned planes, and the remainder fly on commercially owned planes not belonging to a major airline. Of those traveling on major airlines, 50% are traveling for business reasons, whereas 60% of those arriving on private planes and 90% of those arriving on other commercially owned planes are traveling for business reasons. Suppose that we randomly select one person arriving at this airport. What is the probability that the person
- a** is traveling on business?
 - b** is traveling for business on a privately owned plane?
 - c** arrived on a privately owned plane, given that the person is traveling for business reasons?
 - d** is traveling on business, given that the person is flying on a commercially owned plane?

Problem 4

- 3.2** You and a friend play a game where you each toss a balanced coin. If the upper faces on the coins are both tails, you win \$1; if the faces are both heads, you win \$2; if the coins do not match (one shows a head, the other a tail), you lose \$1 (win $-\$1$). Give the probability distribution for your winnings, Y , on a single play of this game.

Problem 5

- 3.6** Five balls, numbered 1, 2, 3, 4, and 5, are placed in an urn. Two balls are randomly selected from the five, and their numbers noted. Find the probability distribution for the following:
- a** The *largest* of the two sampled numbers
 - b** The *sum* of the two sampled numbers

Problem 6

- 3.4** Consider a system of water flowing through valves from A to B . (See the accompanying diagram.) Valves 1, 2, and 3 operate independently, and each correctly opens on signal with probability $.8$. Find the probability distribution for Y , the number of open paths from A to B after the signal is given. (Note that Y can take on the values 0, 1, and 2.)

