Lab for Sections 14.3

Use good notation and show appropriate work.   Name _____
State your solutions to problems in complete sentences.

1. Assume A and B are events in S such that $P(A) = 0.6$, $P(B) = 0.5$, and $P(A \cap B) = 0.2$.
    Draw a probability Venn diagram and then answer the following.

    (a) $P(A \mid B) =$

    (b) $P(B \mid A) =$

    (c) $P(B \mid A') =$

    (d) $P(A \cup B) =$

    (e) Are events A and B independent events? Explain.

    (f) Are events A and B mutually exclusive events? Explain.

2. Assume you have two bags filled with coins. Suppose Bag I contains 2 silver and 4 gold coins. Bag II contains 10 silver and 2 gold coins. Assume you randomly select a bag and then randomly choose a coin. Use a tree diagram to assist in determining the probability that

    (a) the coin drawn is gold,   (b) the coin came from Bag II, given it was gold.

3. One of two urns is selected at random, and from the urn selected, a ball is drawn at random. It is observed that the ball is red. We know that the first urn contains five red balls and two green balls and the second urn contains one red ball and six green balls. Find the probability that the first urn was selected.

4. Automobile drivers can be classified as *G* (good risks), *M* (medium risks), and *B* (bad risks). According to data collected by the Instant Aid Insurance Company, 20 percent of their policy-holders are class *G*, 30 percent are class *M*, and 50 percent are class *B*. The probability of having at least one accident in a year is 0.001 for *G*, 0.005 for *M*, and 0.010 for *B*. Mr. Smith buys a policy from the company and in 6 months has an accident. What is the probability that he is a class *B* driver?

5. The loan officer of a bank knows that 5 percent of all loan applicants are bad risks, 92 percent of all loan applicants who are bad risks are also rated bad risks by a credit advisory service, and 2 percent of all loan applicants who are not bad risks are rated bad risks by the service. What is the probability that a loan applicant who is rated a bad risk by the service is actually a bad risk?

6. In a major eastern city, 60% of the automobile drivers are 30 years of age or older and 40% of the drivers are under 30 years of age. Of all drivers 30 years of age or older, 4% will have a traffic violation in a 12-month period. Of all drivers under 30 years of age, 10% will have a traffic violation in a 12-month period. Assume that a driver has just been charged with a traffic violation; what is the probability that the driver is under 30 years of age?