MTH 3081 : FALL 2009: PRACTICE PROBLEMS FOR QUIZ 1

1). A random experiment has exactly three possible outcomes, call them $\{a, b, c\}$. You are told that a is twice as likely as b, and b is three times as likely as c. Find the probabilities of each of the three outcomes a, b and c.
Solution: $P(a) = 0.6$, $P(b) = 0.3$, $P(c) = 0.1$.

2). Two chips are chosen at random, without replacement, from the an urn which contains 4 black, 3 red and 2 white chips.
a). Draw a tree diagram to represent the sample space.

b). Calculate the conditional probability on each branch of the tree.

c). Find the probability that the two chips have the same color.
Solution: 5/18

d). Find the conditional probability that the first chip is black, given that the second chip is red.
Solution: 1/2

3). A fair die is rolled until the face numbered 6 appears.

a) Find the probability that the die is rolled exactly five times.
Solution: 0.08

b) Find the probability that the die is rolled at least five times.
Solution: 0.482

4). There are two dice on the table. One is a fair die, the other is fixed so that it always comes up showing an even number. You pick one die at random and roll it, getting an even number. Find the probability that the same die will come up with an even number if you roll it again.
Solution: 5/6

5). A computer manufacturer uses chips from three suppliers. Based on past performance, she knows that the chips from supplier #1 will fail with probability 0.1, that the chips from supplier #2 will fail with probability 0.2, and that the chips from supplier #3 will fail with probability 0.5. Accordingly she uses a mixture of these chips, namely 50% from supplier #1, 30% from supplier #2 and 20% from supplier #3.

a) What is the probability that a chip chosen randomly from her mixture will fail?
[Hint: draw a tree diagram to list the outcomes, and find the conditional probabilities.]
Solution: 0.21

b) Given that a chip from her mixture has failed, what is the probability that it came from supplier #3?
Solution: 10/21

6). Show that $P(A \cap B) \geq P(A) - P(B^c)$.

7). Three cards are selected from a standard deck without replacement. Find the conditional probability that the first card is a Heart, given that the second and third cards are Hearts. *Solution:* 11/50