Conditional Probability Worksheet.

1. A and B are two events such that $p(A) = 0.6$, $p(B) = 0.3$ and $p(A \cap B) = 0.2$, find the probability of the following events
   a) $A \cup B$ b) $A|B$ c) $B|A$ d) $A|B'$
   e) are A and B independent
2. A and B are two events such that $p(A) = 0.2$, $p(B) = 0.7$ and $p(A \cup B) = 0.8$, find the probability of the following events
   a) $A \cap B$ b) $A|B$ c) $B|A$ d) $A|B'$
   e) are A and B independent
3. A and B are two events such that $p(A) = 0.2$, $p(B) = 0.7$
   a. Find the probability of $A \cup B$ if A and B are independent.
   b. Find the probability of $A \cup B$ if A and B are mutually exclusive.
   c. Find the probability of $A \cup B$ if A and B are disjoint.

4. There are two bags of cards. The first bag contains 4 cards labeled 1 through 4. The second bag contains 5 cards labeled 10 through 14. If one card is randomly drawn from each bag what is the probability that the sum of the numbers drawn will be prime?

5. Find the probability that the sum in problem 4 is prime given that the sum is less than 13.

6. A box has 10 balls, 6 of which are black and 4 of which are white. Three balls are removed from the box, their color unnoted. Find the probability that a fourth ball removed from the box is white. Assume that the 10 balls are equally likely to be drawn from the box.

7. Suppose we have three chests each having two drawers. Chests 1 and 2 have a gold coin in one drawer and a silver coin in the other drawer. Chest 3 has two gold coins. A chest is selected at random and a drawer opened. It is found to contain a gold coin. Find the probability that the other drawer has a silver coin.

8. Suppose a factory has two machines A and B that make 30% and 70% of the total production respectively. Of their output machine A produces 1% defects and machine B produces 3% defective items. Find the probability that a given defective part was produced by machine B.

9. Professor Nunke tends to be absent minded. If he brings his hat to a classroom there is a 10% chance that he will leave it there. On a rainy Tuesday professor Nunke left his office with his hat. He taught a freshman honors calculus class and then traveled to a different room to teach a graduate level real analysis class. He then returned to his office without his hat due to leaving it in one of the classrooms. What is the probability that he left his hat in the calculus classroom?