Probability and Statistics

Test 1 (September 17)

Name:………………………………………………………………………..

12+12+6+8+12+4+10+12+12+12=

1. Let $P(A \cap B') = 0.32$, $P(B \cap A') = 0.27$, and $P(A \cup B) = 0.80$. Find the following:

    a. $P(A \cap B)$

    b. $P(A \cup B')$

    c. $P(A' \cap B')$

2. Suppose that Pete Sumpras and Andre Agassi are playing a tennis match in which the first player to win three sets wins the match.

    (a)   In how many different ways could this match end?

    (b)   If the probability that Andre will win any particular set against Pete is 0.48, what is the probability that Andre will win the match?

3. How many 4 letter code words are possible using the letters in HOPE if
    a. The letters may not be repeated?
    b. The letters may be repeated?

4. A deck of 52 cards contain 13 hearts. Suppose that the cards are shuffled and distributed among 4 players. Determine the probability that player A will get 6 hearts, player B will get 4 hearts, player C will get 2 hearts, and player D will get 1 heart.

5. A small grocery store had 10 cartons of milk, **three** of which were sour. If you are going to buy the sixth carton of milk sold that day at random, compute the probability of selecting the **third** carton of sour milk sold that day.

6. If A and B are independent events, then show that A and B' are also independent.

7.

  a. If $P(A)=0.5$, $P(B)=0.6$ and A and B are **independent**, find $P(A\cup B)$.

  b. If $P(A)=0.5$, $P(B)=0.3$ and A and B are **mutually exclusive**, find $P(A\cap B')$ and $P(A'\cup B')$.

  c. If $P(A)=0.5$, $P(B)=0.8$ and $A\subset B$, find $P(A\cap B')$ and $P(A'\cup B')$.

8. A box contains three cards. One card is red on both sides, one card is green on both sides, and one card is red on one side and green on the other. One card is selected from the box at random, and the color on one side is observed. If this side is green, find the conditional probability that the other side of the card is also green?

9. Bean seed from supplier A have a 90% germination rate and those from supplier B have an 80% germination rate. A seed packing company purchases 45% of their bean seeds from supplier A and 55% from supplier B and mixes these seeds together.

   a. Find the probability that a seed selected at random from the mixed seeds will germinate, say $P(G)$.
   b. Given that a seed germinates, find the probability that the seed was purchased from supplier B.

10. An urn contains **seven** balls, one marked WIN and six marked LOSE. You and another player take turns selecting a ball from the urn, one at a time. The first person to select the WIN ball is the winner. If you draw first, find the probability that you will win if the sampling is done
    a. With replacement.
    b. Without replacement.