Probability and statistics

Test 1

Fall 09, September 14

Name:………………………………………………………………………………………………..

(3+3+3+3)+10+8+10+(5+5)+ (5+5)+10+(3+3+4)+10+10=100

1   If $P(A)=0.4$, $P(B)=0.5$, and $P(A\cup B)=0.6$, find

    a. $P(A\cap B)$

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

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

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

2   Give a set theoretic proof. Any other argument is worth only 4 points. If A and B are any two events, then $P(A\cup B)=P(A)+P(B)-P(A\cap B)$.

3   The World Series in baseball continues until either the American League team or the National League team wins four games. How many different orders are possible if the series goes seven games?

4   A hand of 13 cards is to be dealt at random and without replacement from an ordinary deck of playing cards. Find the conditional probability that there are at least three kings in the hand given that the hand contains at least two kings.

5   Suppose $P(A|B) = 0.4$ and $P(B) = 0.5$. Find the, $P(A)$ if

a. A and B are independent.

b. $P(A \cap B') = 0.1$.

6   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.

7   Suppose that 14 members of an organization are to be divided into three committees A, B, and C in such a way that each of the committees A and B is to have 4 members and committee C is to have 6 members. In how many different ways can this be done?

8   Two cards are drawn successively and without replacement from an ordinary deck of playing cards. Compute the probability of drawing
        a. Two clubs.
        b. A club on the first draw and a heart on the second draw.
        c. A heart on the first draw and a face card (king, queen, or jack) on the second draw.

9   A drawer contains four black, six white, and eight olive socks. Two socks are selected at random from the drawer. Compute the probability that both socks are olive if it is known that they are the same color.

10   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 **not** germinate, say $P(G')$.
      b. Given that a seed **does not** germinate, find the probability that the seed was purchased from supplier B.