Probability and Statistics
Spring 2006
Test1

Name:………………………………………………………….

24+8+8+8+10+10+4+4+8+10+6 = 100

1   Let $P(A) = 0.45$, $P(B) = 0.65$, and $P(A \cap B) = 0.25$. Find the following:

(a) $P(A \cup B)$.

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

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

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

(e) $P(B \mid A)$.

(f) $P(A \cap B \mid A \cup B)$. First find the set $(A \cap B) \cap (A \cup B)$.

2   Let $P(B) = 0.50$ and $P(A \cap B) = 0.20$. Assuming A and B are independent, find $P(A \cup B)$.

3   Let $P(A) = 0.45$, $P(B) = 0.25$, and A and B are mutually exclusive. Find $P(A' \cap B')$.

4   Give a **set theoretic** proof to **one** of the following theorems.

(a) If A and B are any two events, then $P(A \cup B) = P(A) + P(B) - P(A \cap B)$.

(b) If A and B are independent, then so are A and B'.

(Partial credit will be given to a non set theoretic proof)

5   Suppose that 12 six-sided balanced dice are to be rolled. Find the probability that each of the six numbers will appear twice. Simplify.

6   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?

7   Let A, B,…, J are 10 students in a class. Suppose you want to select 3 students for a committee. Also you want to include A in this group. In how many different ways can you do this?

8   Let A, B, and C are mutually independent events.

   (a)   Write down the four equations equivalent to the above statement.

9   Two cards are drawn successively and without replacement from an ordinary deck of playing cards. Compute the probability of getting a heart on the first draw and a face card (king, queen, or jack) on the second draw.

10   In a certain city, 30% of the people are Conservatives, 50% are Liberals, and 20% are Independents. Records show that in a particular election, 65% of the Conservatives voted, 82% of the Liberals voted, and 50% of the Independents voted.

(a)   If a person in the city who is eligible to vote is selected at random what is the probability that s/he did not vote?

(b)   If a person in the city who is eligible to vote is selected at random and it is learned that s/he did not vote in the last election, what is the probability that s/he is a Liberal?

11   A drawer contains 4 black socks and an unknown number of white socks. Two socks are selected randomly one at a time. If the probability that two socks are of same color is equal to $\frac{7}{15}$, set up an equation to find the number of white socks in the drawer.

Let the number of white socks be x.