Math/Stat 511 Test #1   Name: _____

Show your work! Answers that do not have a justification will receive no credit.

1. (20 Points)

   (a) What is the mean $\overline{x}$ of $x_1, \ldots, x_n$? $\overline{x} =$ _____

   (b) What is the variance s^2 of $x_1, \ldots, x_n$? $s^2 =$ _____

   (c) Define what it means for events $A_1, \ldots, A_k$ to be mutually exclusive.

   (d) Define what if means for events A, B, and C to be independent.

   (e) Let A and B be events with $P(B) \neq 0$. Then what is the definition of the conditional probability $P(A|B)$?

   (f) Complete the following: **Probability** is a set function that assigns to each event A in the sample space S a number $P(A)$, called the probability of the event A, such that the following properties are satisfied:

2. (15 Points) Let A and B be events so that $P(A) = .6$, $P(B) = .8$, $P(A \cup B) = .9$. Then compute

(a) $P(A')$ $\hspace{4cm}$ $P(A') = $ _____

(b) $P(A \cap B)$ $\hspace{4cm}$ $P(A \cap B) = $ _____

(c) $P(A \cup B')$ $\hspace{4cm}$ $P(A \cup B') = $ _____

3. (10 Points) Alice and Bill play a chess tournament where the first person to win 10 games wins the tournament. How many different ways can Alice win the tournament in exactly 17 games?

_____

4. (5 Points) Assume the events A and B are independent and that $P(A) = .3$ and $P(B) = .6$. Then what is $P(A' \cup B)$?

$P(A' \cup B) = $ _____

5. (15 Points) Let A_1 and A_2 be the events that that a person is left or right handed, respectively. Let B_1 and B_2 be the events that a person is left eye dominant or right eye dominant, respectively. A survey in one statistics class yielded the following data:

	B_1	B_2	Total
A_1	10	23	33
A_2	15	25	40
Total	25	48	73

Compute the following:

(a) $P(A_1)$ $P(A_1) =$ _____

(b) $P(A_1|B_2)$ $P(A_1|B_2) =$ _____

(c) The probability that a member of the class is right eye dominant given that they are right handed.

_____

6. (10 Points) Assuming that it is equally likely that a person be born on any of the 12 months of the year, then what is the probability that of 5 people chosen at random no two were born in the same month?

_____

7. (10 Points) Two cards are drawn at random without replacement from a standard deck of 52 playing cards. Then compute

   (a) The probability that both are clubs.

   _____

   (b) The first one is an Ace and the second one is red.

   _____

8. (10 Points) An urn marked **I** contains 5 red and 3 blue balls. A second urn, marked **II**, contains 2 red and 7 blue balls. An experiment is done where one of the two urns is chosen at random and one ball is chosen from it.

(a) Compute the probability that the ball is red. _____

(b) Compute the conditional probability that the ball came from urn **I**, given that it is red.

_____

9. (5 Points) Who is the standard deviate? _____