10/9/2001 MA331 Applied Prob/Stat I Name:_____
Dr. Lunsford Test 1 (100 Points Total)

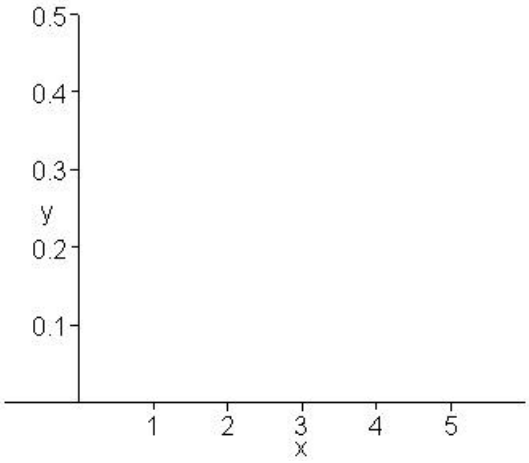
Neatly show all work on this test. Clearly indicate your answers. Good luck!

I. A coin is flipped five times and the result of each flip is recorded (an example outcome is HTHHT). Let X count the number of heads in the five flips. Please answer the following questions concerning this experiment. (17 points total).

a. Suppose we perform the experiment 20 times and get the following data for the value of X:

3, 2, 3, 3, 3, 0, 2, 2, 3, 4,
2, 3, 3, 4, 2, 2, 5, 4, 3, 4

Find and graph the relative frequency distribution for the sample data on the axes provided below. (6 points)



b. Find the sample mean of the data in part (a). You are welcome to use technology here however please show the formula you use to compute this value. (4 points)

c. Find the sample standard deviation of the sample data in part (a). You are welcome to use technology here however please show the formula you use to compute this value. (4 points)

d. Compute the interval $(\overline{x} - s, \overline{x} + s)$ and show it on the histogram below. (3 points)

II. Suppose P is a probability function on a sample space S and A and B are events in S such that

$$P(A) = 0.6,\ P(B) = 0.5, \text{ and } P(A \cup B) = 0.8$$

Please answer the following. (4 points each, 28 points total)

a. $P(A \cap B)$

b. $P(A')$

c. $P(B \mid A)$

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

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

f. Find the probability that event A or event B but not both occur (i.e. the probability that at most one of the two events occurs).

g. Are the events A and B independent events? Why or why not?

III. A drawer contains 4 black, 6 brown, and 8 olive socks. Two socks are selected (without replacement) at random from the drawer. What is the probability that both socks are the same color? (9 points)

IV. Last year's ASU graduates were classified according to gender and from which college they graduated. The following data was obtained:

	Arts & Sciences	Education	Business	Totals
Female	133	206	211	550
Male	125	142	183	450
Totals	258	348	394	1000

Suppose one of last year's graduates is chosen at random. Let A be the event they graduated from the College of Arts & Sciences, E be the event they graduated from the College of Education, B be the event they graduated from the College of Business, M be the event the graduate is male, and F be the event the graduate is female. Find the indicated probabilities below. For each probability, describe in words, using a complete English sentence, the probability that you have found. (4 each – 12 total)

(a) $P(F)$

(b) $P(M \cap B)$

(c) $P(F \mid E)$

VI. Urn A contains 4 red chips and 7 white chips. Urn B contains 3 red chips and 6 white chips. A chip is drawn from Urn A and placed into Urn B. A chip is then drawn from Urn B. If this chip is red then what is the probability that the chip drawn from Urn A was red? Clearly indicate what events you are using to determine this probability. (10 points)

VII. A fair coin is flipped five times. Let the random variable X be the number of heads in the five flips. Please answer the following (6 points each, 12 total)

(a) Find the probability of getting at least one head in the five flips. Hint: Think complement!

(b) What is the probability of getting exactly 4 heads in the five flips given that at least one head was obtained?

VII. An urn contains 8 red balls and 10 blue balls. Five balls are drawn one at a time from the urn without replacement and the color of each draw is recorded. An R is recorded when a red ball is drawn and a B is recorded when a blue ball is draw. Please answer the following: (4 points each – 12 total)

(a) What is the probability of the five draws being RRBBR?

(b) What is the probability of drawing exactly two blue balls in the five draws?

(c) Suppose a sixth ball is drawn. What is the probability that this ball is the third blue ball drawn?

BONUS (Up to 5 points): In your reading of the book, "*Statistics You Can't Trust*," you learned about the average (or mean) and the variance (and hence the standard deviation) of a set of data. Explain what the mean and the standard deviation measure about a set of data, any sensitivity to the data these measures may have, and why one would like to know BOTH measures for a set of data. You may want to illustrate your points with simple example sets of data. Please use a separate sheet of paper to answer this question.