Name: _____

Group _____

1. For each part of each question, please indicate which chapter it came from and then answer the question.

There are 5 horses running in a race, and you own the one named Rosie. Let X be the order that Rosie finishes the race (1st, 2nd, etc.). Below is a table for the probability for each x-value

х	1	2	3	4	5
P(X = x)	0.4	0.2	0.1	?	0.02

You need to pay \$500 to enter in the race and will win \$1000 for first place, \$750 for second place, \$500 for third place and nothing for placing any lower.

- a. What is the missing value in the above table?
- b. What place is Rosie expected to finish?
- c. What is the standard deviation of the place Rosie will finish?

d. Find the cumulative distribution function.

- e. If Rosie is at least 2nd, she will automatically be entered in a Stakes Race. If Rosie is 3rd or 4th, there is a 20% chance that she can run in the Stakes Race. Using both the mass and the CDF, what is the probability that Rosie will be 3rd or 4th?
- f. (OPTIONAL) What is the probability that Rosie will be entered in a Stakes Race? (Hint: this problem is based from Part 1 in the book).

g. What are the expected winnings (or losses) for Rosie (remember the entrance fee)?

h. What is the standard deviation of the winnings (or losses) for Rosie?

- i. If the entrance fee of the next race depends on how well Rosie does in this race according to: fee = 100(6 - X) - 50, what is the entrance fee are you expecting to pay for Rosie's next race?
- j. What is the standard deviation of the next entrance fee?

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- 2. True/False questions. Which of the following statements are true? Explain your answer.
- a) The graph of P(X = x) must be non-decreasing.
- b) P(X = x) can be negative for a particular value of x.
- c) P(X = x) can be 0 for a particular value of x.
- d) $F_x(x)$ can be 1 for a particular value of x.
- e) The graph of $F_X(X)$ must be non-decreasing.
- f) $F_X(x)$ can be negative for a particular value of x.
- g) The graph of $F_X(x)$ must be continuous with no jumps.
- h) $F_X(x)$ can be 0 for a particular value of x.
- i) The mean can be negative.
- j) The mean can be 0.
- k) The standard deviation can be negative.
- m) The standard deviation can be greater than the mean.
- n) The expected value of X² is always positive.

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- 3. A person makes an average of 3.12 phone calls a day with a standard deviation of 1.77 phone calls. Let X denote the number of calls made per day.
- a) What is the expected value of X²?
- b) What is the expected value of -12X + 10?
- c) What is the variance of -12X + 10?
- 4. A probability mass function for the class sizes at a small college is given in the table below (assume that these are the only allowed class sizes):

size	10	20	30	40	50	60	70
p(size)	0.05	0.15	0.45	0.10	0.10	0.10	0.05

- a) Is this a valid mass? Why or why not?
- b) What is the expected value of the class size for a class chosen at random?
- c) What is the standard deviation of the class size for a class chosen at random?
- d) What percentage of classes are within (exclusive) one standard deviation of the mean class size?
- e) Given that a class has at least 30 students, what is the probability that it has at least 60 students?
- f) Given that a class has at least 30 students, what is the probability that it has more than 60 students?