Stat 2470, 1/22 Discussion Questions Name ______________________

Instructions: Attempt to answer these questions by reading the textbook or with online resources before coming to class on the date above.

1. What is the definition of a random variable?

any rule that associates a number w/ any outcome in S (sample space) ~ a function whose domain is The sample Space and whose range is $\mathbb{R}$.

2. Why are random variables denoted by capital letters when we refer to them in statements and notation, but by lowercase letters in formulas?

X (cap) refers to The function that associates outcomes w/ the sample space whereas x (lower) refers to The value in the range so associated.

3. What are the properties of a Bernoulli random variable?

only possible values are 0 & 1.

4. What is the difference between a discrete and continuous random variable? Give an example of each type.

discrete: part of a finite (or countably infinite) set.
Continuous: uncountably infinite set – heights, weights, etc.
Categorical data, ages;

5. How is a discrete probability distribution typically displayed? Give an example from the book.

in a table

x	0	1	2	3	4	5	6
p(x)	.05	.10	.15	.25	.20	.15	.10

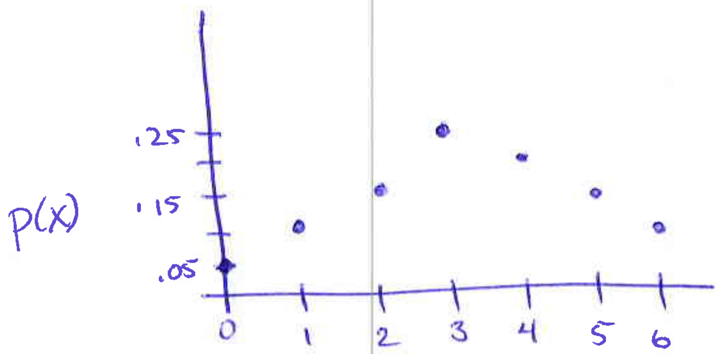
6. Give one example of a probability mass function (or a discrete probability density function) using a formula.

$$p(x) = \begin{cases} .8 & \text{if } x=0 \\ .2 & \text{if } x=1 \\ 0 & \text{if } x\neq 0 \text{ or } x\neq 1 \quad (\text{otherwise}) \end{cases}$$

or

$$p(x) = \begin{cases} (1-p)^{x-1}p & x=1,2,3,\ldots \\ 0 & \text{otherwise} \end{cases}$$

7. Graph the distribution function you choose in #5 above.



8. How is a parameter defined in this section?

depends on any of a number of possible values determining different probability distributions

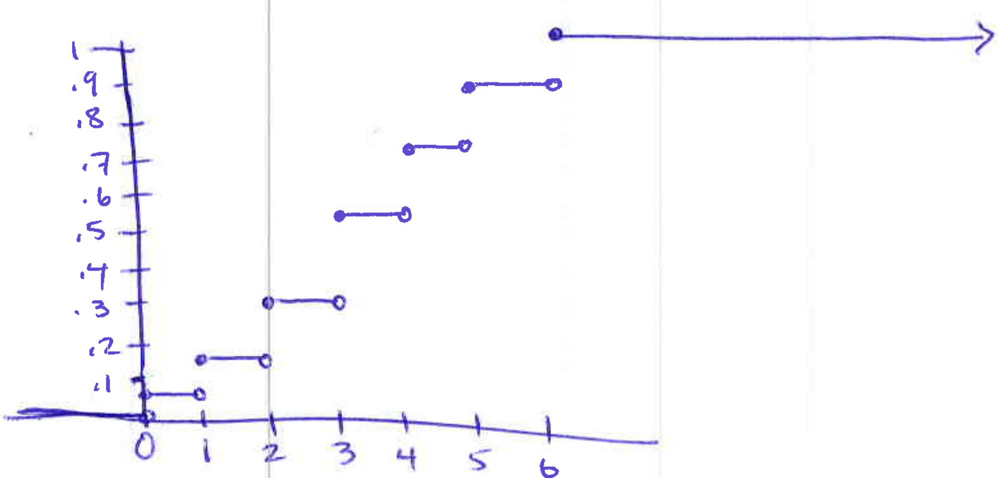
9. Describe how to calculate a cumulative distribution function from the probability mass function in your own words. Find the cumulative distribution function for the probability mass function you gave in #5 above.

Start w/ 0 until the first value of X occurs. Then add the new value. Continue until the next value of X then add the new probability into the total. Continue like this until you get to 1 (or all probabilities have been summed.)

$$F(x) = \begin{cases} 0 & x < 0 \\ .05 & 0 \le x < 1 \\ .15 & 1 \le x < 2 \\ .30 & 2 \le x < 3 \\ .55 & 3 \le x < 4 \\ .75 & 4 \le x < 5 \\ .90 & 5 \le x < 6 \\ 1 & x \ge 6 \end{cases}$$

10. How does the notation change for the cumulative distribution function? Sketch the graph of the function above.

use capital letters (usually F) for cumulative distributions



11. If you are given the cumulative distribution function, how can you back out of that to find the probability mass function?

find the difference between each piece of the cumulative distribution and assign it the value where the distribution jumps.