Name: _____ Group _____

A) The following is the joint mass of the number of bedrooms (X) and bathrooms (Y) for 50 randomly selected homes in Prescott, Arizona. (*Reality 2000/Better Homes and Gardens* of Prescott, AZ)

Bedrooms, X \ Bathrooms, Y	2	3	4	5
2	0.06	0	0	0
3	0.28	0.24	0.04	0
4	0.04	0.22	0.1	0.02

a) Obtain the marginal masses. You may place the values above.

b) Obtain the joint CDF of X and Y. You only need to list the values of the integers above.

c) What are the marginal CDFs, $F_X(x)$ and $F_Y(y)$?

1) a) Suppose that one of the homes is selected at random, what is the probability that there are fewer than 4 bathrooms and fewer than 4 bedrooms? Use both the joint mass and the joint CDF.

b) Suppose that one of the families is selected at random, what is the probability that there are greater than 2 bathrooms and greater than 3 bedrooms? Use both the joint mass and the joint CDF.

2) a) using the mass, determine if X and Y are independent.

b) Using the CDF, determine if X and Y are independent.

d) Determine if X and Y are independent by using both the joint mass and the joint CDF.

Joint Mass

	y	1	2	$p_X(x)$
x	1	0.25	0.25	0.5
	2	0.25	0.25	0.5
	$p_Y(y)$	0.5	0.5	1.00

Joint CDF

	y	1	2
x	1	0.25	0.50
	2	0.50	1.00

3) a) Give the number of bathrooms (Y), determine and interpret the condition mass of the number of bedrooms (X)

b) Give the number of Bedrooms (X), determine and interpret the condition mass of the number of Bathrooms (Y)

4) a) Design an example which has the same marginal masses, but the joint mass is different.

b) In another area, the number of bedrooms and bathrooms for another 50 houses is as follows:

Bedrooms, X \ Bathrooms, Y	2	3	4	5
2	8	0	0	0
3	15	14	1	0
4	1	7	3	1

What is the joint mass?

5) Roll two 4-sided dice. Let X denote the minimum of the two values that appear, and let Y denote the maximum of the two values that appear. This is similar to Example 9.3.

a) Find the joint mass $p_{X,Y}(x,y)$ of X and Y.

b) Find the joint CDF $F_{X,Y}(x,y)$ of X and Y.

c) Find the following probabilities (using the mass).

i) $P(X = Y)$

ii) $P(X < Y)$

iii) $P(X > Y)$

d) Are X and Y independent?