

Jointly Distributed random variables Practice problems

Example-1

An insurance agency has customers with both home and auto policy. For each type of policy, a deductible amount must be specified.

For auto policy, choices are \$100 and \$250, for home policy, choices are \$0, \$100, and \$200.

Suppose a customer is selected at random. Let:

X = his deductible on the auto policy

Y = his deductible on the home policy

Suppose the joint pmf is given by the insurance company in the accompanying joint probability table:

$p(x, y)$		y		
		0	100	200
x	100	.20	.10	.20
	250	.05	.15	.30

1) find $P(Y \geq 100)$

2) find marginal pmf of x and y

2) A bank operates a drive-up and a walk-up window. Let

X = the proportion of time the drive-up facility is in use

Y = the proportion of time the walk-up window in use

Say the manager has given us the joint pdf based on his experience:

$$f(x, y) = \begin{cases} \frac{6}{5}(x + y^2) & 0 \leq x \leq 1, 0 \leq y \leq 1 \\ 0 & \text{otherwise} \end{cases}$$

a) Verify whether it is a valid joint pdf?

b) The probability that neither facility is busy more than one-quarter of the time is

3) Roll two dice. Let X be the value on the first die and let T be the total on both dice. Find the joint probability table.

4) Roll two dice. Let X be the value on the first die and let Y be the value on the second die. Then both X and Y take values 1 to 6 and the joint pmf is $p(i, j) = 1/36$ for all i and j between 1 and 6. Describe the event $B = 'Y - X \geq 2'$ and find its probability

5) Suppose X and Y both take values in $[0, 1]$ with density $f(x, y) = 4xy$. Show $f(x, y)$ is a valid joint pdf, If event $A = 'X < 0.5 \text{ and } Y > 0.5'$ find its probability

b) Find its joint cdf