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## Sample Questions

### Chapter 10

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**Question 1** The probability distribution of a discrete random variable  $X$  is given by  $P(X = 1) = 1/4$ ,  $P(X = 0) = 2/4$ ,  $P(X = -1) = 1/4$ .  $Y = X^2$ .

- Create the joint distribution table for  $X$  and  $Y$ .
- Calculate the  $Cov(X, Y)$ .
- Calculate the  $\rho(X, Y)$ .
- Does  $X$  and  $Y$  independent or not?

**Question 2** Let  $P(X = a, Y = b)$  is given by the following table.

b	a		
	-1	0	1
4	$\lambda - \frac{1}{16}$	$-\lambda$	$\frac{1}{4}$
5	$\frac{1}{8}$	$\frac{1}{16}$	$\frac{1}{4}$
6	$\lambda$	$\frac{1}{8}$	$\frac{1}{4} - \lambda$

- Which are the values  $\lambda$  can attain?
- Calculate the marginal distribution  $p(x)$  and  $p(y)$ .
- Calculate  $E[X]$  and  $E[Y]$ .
- Calculate  $Var[X]$  and  $Var[Y]$ .
- Calculate  $E[X + Y]$  and  $Var[X + Y]$ .
- Calculate  $E[XY]$ .
- Check whether  $E[X + Y] = E[X] + E[Y]$ .
- Check whether  $Var[X + Y] = Var[X] + Var[Y]$ .
- Check whether  $E[XY] = E[X]E[Y]$  j. Is there a value of  $\lambda$  for which  $X$  and  $Y$  are independent?