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RANDOM VARIABLES

Definition : A real variable 'x' whose value is determined by the outcome of a random experiment is called a random variable.

Example: A random experiment consists of two tosses of a coin. Consider the random Vaniable which is the number of heads (0,1 or 2).

Outcome : HH HT TH TT Value of X : 2 1 1 0 Types of random Variables :

There are two types of random variables : 1. Discrete random variable

2 - Continuous random Variable.

Discrete random Variable:

A random Variable Which can assume Only a Countable number of real Values is called a discrete random Variable.

Examples :

1. Number of telephone calls per unit time.

2. Marks obtained in a test.

Distribution function (or) Cumulative Distribution Function of the random Variable X:

The C.D.F of a random variable x is defined as,

$$F(x) = P(x \le x) = \sum_{\substack{X_i \le x}} P(x_i)$$

in $(-\infty, \infty)$



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PROBLEMS :

(1) Find the Constant 'k' from the following probability distribution of a discrete random Variable X.

p(x) 0.1 0.2 K 2K 0.1	1	

Solution: We know that,

$$\sum_{i=1}^{\infty} p(x_i) = 1$$

$$\sum_{i=1}^{5} p(x_i) = 1$$

$$p(1) + p(2) + p(3) + p(4) + p(5) = 1$$

$$0.1 + 0.2 + k + 2k + 0.1 = 1$$

$$3k + 0.4 = 1$$

$$3k = 1 - 0.4 = 0.6$$

$$3k = 0.6$$

$$k = 0.6$$

$$k = 0.6$$

For the following Probability distribution,
 (i) Find the distribution function of X,
 (ii) What is the Smallest Value of 'x' for which P(x ≤ x) > 0.5
 Solution:
 (i) The distribution function of X' is given by,





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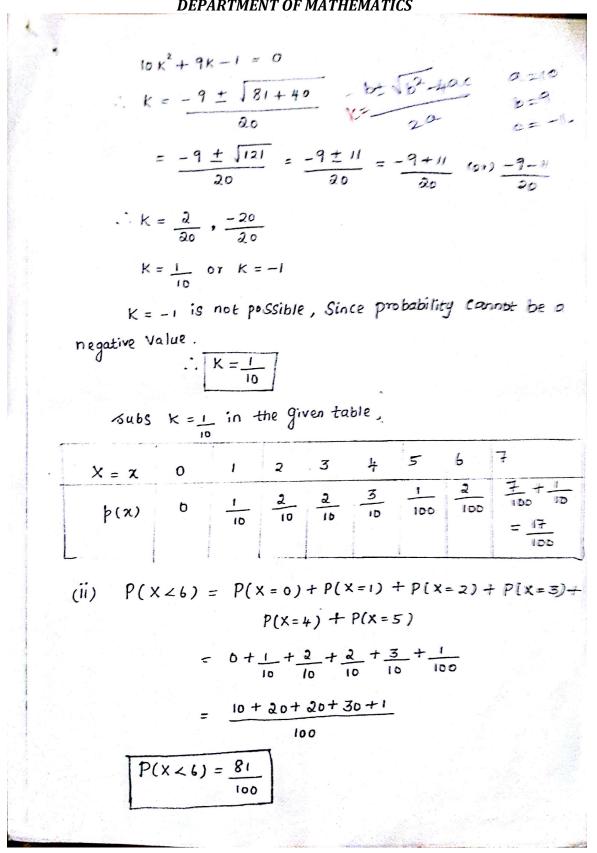
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1	lease.	
	X = X	$F(x) = P(x \le x)$
	D	$F(0) = P(x \le 0) = P(x = 0) = \frac{1}{4} = 0.25$
	1	$F(1) = P(X \le 1) = P(X = 0) + P(X = 1)$
	2	$= \frac{1}{4} + \frac{2}{4} = \frac{3}{4} = 0.75$ $F(2) = P(X \le 2) = P(X = 0) + P(X = 1) + P(X = 2)$ $= \frac{1}{4} + \frac{2}{4} + \frac{1}{4} = 1$
(<i>i</i> i)	The Small is 1.	lest value of 'x' for which $P(x \le x) > 0.5$
(i) (ii) (iii)	Find k $I_{f} P(x)$ letermine Lion: We Know i = 1	Variable 'x' has the following probability function $ \begin{array}{c ccccccccccccccccccccccccccccccccccc$
28 1.2 3		$) + p(z) + \ldots + p(\tau) = 1$
(0+K+2	$K + 2K + 3K + K^{2} + 2K^{2} + 7K^{2} + K = 1$





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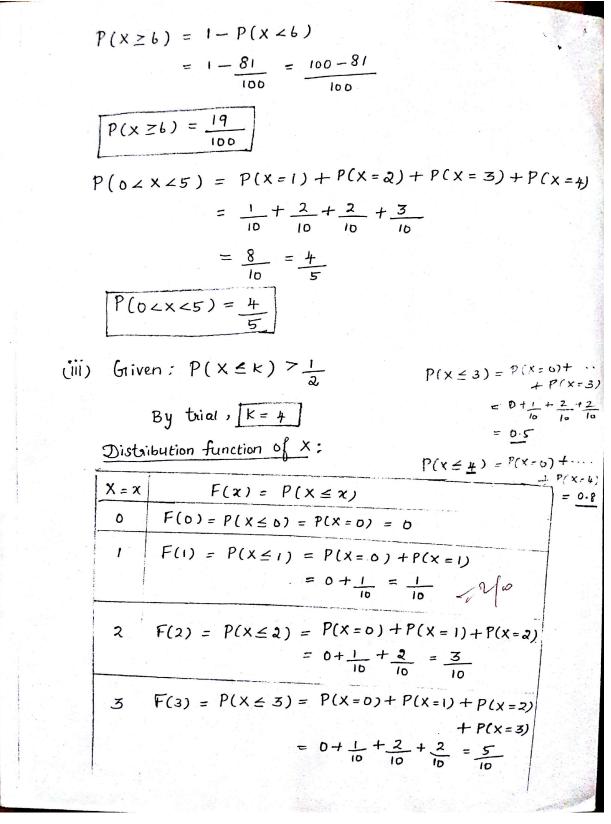




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