

Assignment2

CS20Btech11035 -NYALAPOGULA MANASWINI

Download python code from

[https://github.com/N-Manaswini23/Assignment-2/blob/main/assign2%20\(1\).py](https://github.com/N-Manaswini23/Assignment-2/blob/main/assign2%20(1).py)

According to piecewise function given in the question:

GATE QUESTION 63

Let the random variable X have the distribution function:

$$F(x) = \begin{cases} 0 & x < 0 \\ \frac{x}{2} & 0 \leq x < 1 \\ \frac{3}{5} & 1 \leq x < 2 \\ \frac{1}{2} + \frac{x}{8} & 2 \leq x < 3 \\ 1 & x \geq 3 \end{cases} \quad (0.0.1) \quad \text{Substituting (0.0.7) and (0.0.5) in (0.0.3)}$$

Then $P(2 \leq X \leq 4)$ is equal to

SOLUTION

Let X be a binomial random variable.

Cumulative distribution function F(x) is given in (0.0.1)

CDF(cumulative distribution function) of a random variable X is defined as follows:

$$F_X(r) = \Pr(X \leq r) \quad (0.0.2)$$

where f_x is probability density function.

S.No	x(range)	F(x)
1	$x < 0$	0
2	$0 \leq x < 1$	$\frac{x}{2}$
3	$1 \leq x < 2$	$\frac{3}{5}$
4	$2 \leq x < 3$	$\frac{1}{2} + \frac{x}{8}$
5	$3 \leq x$	1

TABLE 0: This is table 1

we need to find $P(2 \leq x < 4)$

$$P(2 \leq x < 4) = F(4) - F(2) \quad (0.0.3)$$

$$4 > 3 \quad (0.0.4)$$

$$\therefore F(4) = 1 \quad (0.0.5)$$

$$F(2) = \frac{1}{2} + \frac{x}{8} \quad (0.0.6)$$

$$= \frac{3}{4} \quad (0.0.7)$$

$$P(2 \leq X < 4) = F(4) - F(2) \quad (0.0.8)$$

$$= 1 - \frac{3}{4} \quad (0.0.9)$$

$$= \frac{1}{4} \quad (0.0.10)$$

$$\therefore P(2 \leq X < 4) = \frac{1}{4} \quad (0.0.11)$$

$$(0.0.12)$$

