

AI1103: Assignment 3

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Download all latex codes from

<https://github.com/Geetha495/Assignment3/blob/main/Assignment2.tex>

Download all python codes from

<https://github.com/Geetha495/Assignment3/blob/main/Assignment2.py>

2 SOLUTION

Given $Y = 3X + 2$
CDF of Y ,

$$\begin{aligned} F_Y(Y) &= \Pr(Y \leq y) \\ &= \Pr\left(X \leq \frac{y-2}{3}\right) \\ &= F_X\left(\frac{y-2}{3}\right) \end{aligned}$$

1 PROBLEM

A continuous random variable X has the probability density function

$$f(x) = \begin{cases} \frac{3}{5}e^{-\frac{3}{5}x} & x > 0 \\ 0 & x \leq 0 \end{cases}$$

The probability density function of $Y = 3X + 2$ is

1)

$$f(y) = \begin{cases} \frac{1}{5}e^{-\frac{1}{5}(y-2)} & y > 2 \\ 0 & y \leq 2 \end{cases}$$

2)

$$f(y) = \begin{cases} \frac{2}{5}e^{-\frac{2}{5}(y-2)} & y > 2 \\ 0 & y \leq 2 \end{cases}$$

3)

$$f(y) = \begin{cases} \frac{3}{5}e^{-\frac{3}{5}(y-2)} & y > 2 \\ 0 & y \leq 2 \end{cases}$$

4)

$$f(y) = \begin{cases} \frac{4}{5}e^{-\frac{4}{5}(y-2)} & y > 2 \\ 0 & y \leq 2 \end{cases}$$

Thus, pdf of Y ,

$$\begin{aligned} f_Y(y) &= \frac{1}{3}f_X\left(\frac{y-2}{3}\right) \\ &= \frac{1}{3} \times \begin{cases} \frac{3}{5}e^{-\frac{3}{5}\left(\frac{y-2}{3}\right)} & y > 2 \\ 0 & y \leq 2 \end{cases} \\ &= \begin{cases} \frac{1}{5}e^{-\frac{1}{5}(y-2)} & y > 2 \\ 0 & y \leq 2 \end{cases} \end{aligned}$$

Hence, correct option is 1.