

# AI1103-Assignment 4

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Download all python codes from

<https://github.com/asishcs2011010/demo/blob/main/assignment-4/assignment-4.py>

and latex-tikz codes from

[https://github.com/asishcs2011010/demo/blob/main/assignment-4/assignment-4\(7\).tex](https://github.com/asishcs2011010/demo/blob/main/assignment-4/assignment-4(7).tex)

$$G(y) = \begin{cases} 0 & y < 0 \\ \frac{2\sqrt{y}}{3} & 0 \leq y < 1 \\ \frac{\sqrt{y}+1}{3} & 1 \leq y < 4 \\ 1 & y \geq 4 \end{cases}$$

The plot of CDF is given in the Figure 0

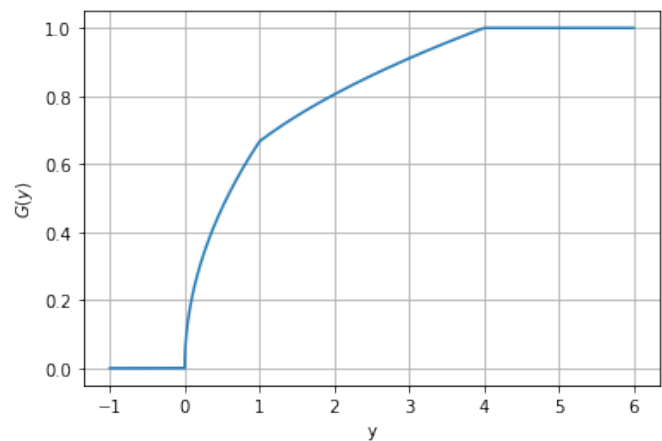


Fig. 0: CDF of Y

QUESTION NO

gov/stats/2015/statistics-I(1), Q.1(C)

QUESTION

1)(c) Let X have pdf

$$f(x) = \begin{cases} \frac{1}{3} & -1 \leq x < 2 \\ 0 & \text{otherwise} \end{cases}$$

Obtain the cdf of  $Y=X^2$

SOLUTION

CDF of X is defined as,

$$F_X(x) = \Pr(X \leq x) \quad (0.0.1)$$

The cdf of  $Y = X^2$  is given by  $G(y)=F_X(y)$

$$F_X(y) = \Pr(X^2 \leq y) = \Pr(-\sqrt{y} \leq X \leq \sqrt{y}) \quad (0.0.2)$$

$$G(y) = \int_{\max(-1, -\sqrt{y})}^{\min(2, \sqrt{y})} \frac{1}{3} dx \quad (0.0.3)$$

As,  $-1 \leq -\sqrt{y} \leq X \leq \sqrt{y} \leq 2$ , we take limits as  $\max(-1, -\sqrt{y})$  and  $\min(2, \sqrt{y})$

if  $y < 0$ ,  $\max(-1, -\sqrt{y}) = \min(2, \sqrt{y}) = 0$

if  $0 \leq y < 1$ ,  $\max(-1, -\sqrt{y}) = -\sqrt{y}$ ,

$\min(2, \sqrt{y}) = \sqrt{y}$

if  $1 \leq y < 4$ ,  $\max(-1, -\sqrt{y}) = -1$ ,  $\min(2, \sqrt{y}) = \sqrt{y}$

if  $y \geq 4$ ,  $\max(-1, -\sqrt{y}) = -1$ ,  $\min(2, \sqrt{y}) = 2$