

AI1103 - Assignment 4

I.Rajasekhar Reddy – CS20BTECH11020

Download all latex-tikz codes from

[https://github.com/rajasekhar156/assignment-4/
blob/main/main.tex](https://github.com/rajasekhar156/assignment-4/blob/main/main.tex)

QUESTION:GATE 2001 (EC), Q. 1.20

The PDF of a Gaussian random variable X is given

by $P_X(x) = \frac{1}{3\sqrt{2\pi}} e^{\frac{-(x-4)^2}{18}}$. The probability of the event $X = 4$ is

- 1) $\frac{1}{2}$
- 2) $\frac{1}{3\sqrt{2\pi}}$
- 3) 0
- 4) $\frac{1}{4}$

ANSWER:

Given PDF function is

$$P_X(x) = \frac{1}{3\sqrt{2\pi}} e^{\frac{-(x-4)^2}{18}} \quad (0.0.1)$$

Since continuous probability functions are defined for an infinite number of points over a continuous interval, the probability at a single point is always zero. Probabilities are measured over intervals, not single points. That is, the area under the curve between two distinct points defines the probability for that interval.

$$\Pr(X = 4) = \lim_{\delta \rightarrow 0} \int_x^{x+\delta} \frac{1}{3\sqrt{2\pi}} e^{\frac{-(x-4)^2}{18}} dx \quad (0.0.2)$$

$$= 0 \quad (0.0.3)$$

Hence the probability is 0.