Assignment 2

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latex-tikz codes from

https://github.com/diya−goyal−29/AI1103/blob/main/Assignment%202/Assignment%202.tex

Gate problem no. 42

Let X be a zero mean unit variance Gaussian random variable. $E[|X|]$ is equal to ...

Solution

Mean = $\mu = 0$

Variance = $\sigma = 1$

Gaussian Probability Distribution Function

$$= p(x) \tag{0.0.1}$$

$$= \frac{1}{\sqrt{2\pi\sigma}} \exp(\frac{-(x-\mu)^2}{2\sigma^2}) \tag{0.0.2}$$

$$= \frac{1}{\sqrt{2\pi}} \exp(\frac{-x^2}{2}) \tag{0.0.3}$$

$$E[|X|] = \int_{-\infty}^{\infty} |x|p(x) \tag{0.0.4}$$

$$= 2\int_{0}^{\infty} xp(x)dx \tag{0.0.5}$$

$$= 2\int_{0}^{\infty} x\frac{1}{\sqrt{2\pi}} \exp(\frac{-x^2}{2})dx \tag{0.0.6}$$

$$= \sqrt{\frac{2}{\pi}}\int_{0}^{\infty} x \exp(\frac{-x^2}{2})dx \tag{0.0.7}$$

$$= \sqrt{\frac{2}{\pi}} \tag{0.0.8}$$

$$= 0.7978 \tag{0.0.9}$$