

# Assignment 2

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latex-tikz codes from

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

## 1 GATE PROBLEM NO. 42

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

## 2 SOLUTION

Mean =  $\mu = 0$

Variance =  $\sigma = 1$

Gaussian Probability Distribution Function

$$= f(x) \quad (2.0.1)$$

$$= \frac{1}{\sqrt{2\pi}\sigma} \exp\left(\frac{-(x-\mu)^2}{2\sigma^2}\right) \quad (2.0.2)$$

$$= \frac{1}{\sqrt{2\pi}} \exp\left(\frac{-x^2}{2}\right) \quad (2.0.3)$$

$$E[|X|] = \int_{-\infty}^{\infty} |x|f(x) \quad (2.0.4)$$

$$= 2 \int_0^{\infty} xf(x)dx \quad (2.0.5)$$

$$= 2 \int_0^{\infty} x \frac{1}{\sqrt{2\pi}} \exp\left(\frac{-x^2}{2}\right) dx \quad (2.0.6)$$

$$= \sqrt{\frac{2}{\pi}} \int_0^{\infty} x \exp\left(\frac{-x^2}{2}\right) dx \quad (2.0.7)$$

$$= \sqrt{\frac{2}{\pi}} \quad (2.0.8)$$

$$= 0.7978 \quad (2.0.9)$$