

ASSIGNMENT-9

Ojaswa Pandey

Download all python codes from

<https://github.com/behappy0604/Summer-Internship-IITH/tree/main/Assignment-9>

and latex-tikz codes from

<https://github.com/behappy0604/Summer-Internship-IITH/tree/main/Assignment-9>

1 QUESTION No. 8.1

Let U and V be two independent zero mean Gaussian random variables of variances $\frac{1}{4}$ and $\frac{1}{9}$ respectively. The probability $P(3V \geq 2U)$ is

- 1) $\frac{4}{9}$ 2) $\frac{1}{2}$ 3) $\frac{2}{3}$ 4) $\frac{5}{9}$

2 SOLUTION

Since U and V are given to be normal random variables, therefore their difference will also be a normal random variable.

Here, let

$$Y = 3V - 2U \quad (2.0.1)$$

where Y is also a normal random variable with mean

$$M = 0 \quad (2.0.2)$$

and variance

$$V_r = 32 \times \frac{1}{9} + 22 \times \frac{1}{4} = 2 \quad (2.0.3)$$

So it will be symmetric about mean that is 0.

$$\therefore P(Y \geq 0) = \boxed{\frac{1}{2}} \text{ (by symmetry property)} \quad (2.0.4)$$

Hence option (b) is correct.