

AI1103-Assignment 6

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Download all python codes from

<https://github.com/AravindShounik/AI1103/blob/main/Assignment-6/Codes/assignment-6.py>

and latex-tikz codes from

<https://github.com/AravindShounik/AI1103/blob/main/Assignment-6/assignment-6.tex>

QUESTION GATE 2014 ME-SET1, Q.28 (ME SECTION)

In the following table, X is a discrete random variable and $p(X = x)$ is the probability density. The standard deviation of X is

| | | | |
|----------|-----|-----|-----|
| X | 1 | 2 | 3 |
| $p_X(k)$ | 0.3 | 0.6 | 0.1 |

SOLUTION

The mean of the distribution (μ) is given as

$$\mu = \sum_{k=1}^3 k p_X(k) \quad (0.0.1)$$

$$= (0.3 \times 1) + (0.6 \times 2) + (0.1 \times 3) \quad (0.0.2)$$

$$= 0.3 + 1.2 + 0.3 \quad (0.0.3)$$

$$= 1.8 \quad (0.0.4)$$

We know that variance(σ^2) is

$$\sigma^2 = E(X^2) - \mu^2 \quad (0.0.5)$$

$$= \sum_{k=1}^3 k^2 p_X(k) - \mu^2 \quad (0.0.6)$$

$$= (0.3 \times 1^2) + (0.6 \times 2^2) + (0.1 \times 3^2) - 1.8^2 \quad (0.0.7)$$

$$= (0.3) + (2.4) + (0.9) - 3.24 \quad (0.0.8)$$

$$= 0.36 \quad (0.0.9)$$

We know that standard deviation (σ) is

$$\sigma = \sqrt{\sigma^2} \quad (0.0.10)$$

$$\sigma = \sqrt{0.36} \quad (0.0.11)$$

$$= 0.6 \quad (0.0.12)$$