Assignment

EE23010: Probability and Random Processes
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Question: For the following probability distribution determine standard deviation of the random variable X.

X	2	3	4
p_X	0.2	0.5	0.3

Solution: Given, X be the random variable and p_X is the probability distribution.
Standard deviation is given by

$$\sigma_X = \sqrt{E(X^2) - E(X)^2} \tag{1}$$

$$= \sqrt{\sum_{i=1}^{n} X_i^2 p_{Xi} - [\sum_{i=1}^{n} X_i p_{Xi}]^2} \tag{2}$$

$$= \sqrt{(2)^2(0.2) + (3)^2(0.5) + (4)^2(0.3) - ((2)(0.2) + (3)(0.5) + (4)(0.3))^2} \tag{3}$$

$$= \sqrt{10.1 - 9.61} \tag{4}$$

$$= 0.7 \tag{5}$$