Assignment 5

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Outline

Question

Exercise 13.4.15

In a meeting, 70% of the members favour and 30% oppose a certain proposal. A member is selected at random and we take X = 0 if he opposed, and $X = 1$ if he is in favour. Find $E(X)$ and $Var(X)$.

Solution

Given that the random variable X has the following probability distribution.

X	0	1
P(X)	0.3	0.7

Table 1: Probability distribution of random variable X

1. Finding $E(X)$.

$$E(X) = \sum XP(X) \tag{1}$$
$$= 0 \times P(0) + 1 \times P(1) \tag{2}$$
$$= P(1) \tag{3}$$
$$= 0.7 \tag{4}$$

1. Finding $Var(X)$.

$$\begin{aligned} Var(X) &= E(X^2) - (E(X))^2 && (5)\\ &= \sum X^2 P(X^2) - (0.7)^2 && (6)\\ &= 0^2 \times P(0^2) + 1^2 \times P(1^2) - 0.49 && (7)\\ &= 0 + (0.7) - 0.49 && (8)\\ &= 0.21 && (9) \end{aligned}$$

$\therefore$ E(X) $= 0.7$ and Var(X) $= 0.21$