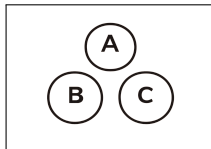


15 Discrete Distribution Expected Value Variable

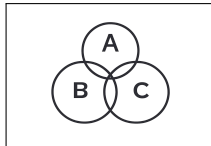
C



$$X = \{1, 2, 3, 4, 5, 6\}$$

$$P(1) = P(2) = P(3) = P(4) = P(5) = P(6) = \frac{1}{6}$$

$$E[X] = ?$$



$$E[X] = \sum xP(X = x)$$

$$E[X] = \frac{1}{6}(1 + 2 + 3 + 4 + 5 + 6)$$

$$E[X] = \frac{1}{6}(21)$$

$$E[X] = \frac{21}{6}$$

$$E[X] = 3.5$$



$$\Omega = \{(i, j) : i, j \in \{1, 2, 3, 4, 5, 6\}\} \rightarrow |\Omega| = 36$$

$$X = \{(i, j) \in \Omega : i + j = 7\} \rightarrow |X| = 6$$

$$X^C = \{(i, j) \in \Omega : i + j \neq 7\} \rightarrow |X^C| = 30$$

$$E(X) = ?$$

15 Discrete Distribution Expected Value Variable

C



$$\Omega = \{(i, j) : i, j \in \{1, 2, 3, 4, 5, 6\}\} \rightarrow |\Omega| = 36$$

$$X = \{(i, j) \in \Omega : i + j = 7\} \rightarrow |X| = 6$$

$$X^C = \{(i, j) \in \Omega : i + j \neq 7\} \rightarrow |X^C| = 30$$

$$E(X) = ?$$

$$P(X = 8) = P(X) = \frac{|X|}{|\Omega|} = \frac{6}{36} = \frac{1}{6}$$

$$P(X = -2) = P(X^C) = \frac{|X^C|}{|\Omega|} = \frac{30}{36} = \frac{5}{6}$$

$$E(X) = \sum_x xP(X = x)$$

$$E(X) = 8 \times P(X = 8) + (-2) \times P(X = -2)$$

$$E(X) = 8 \times \frac{1}{6} + (-2) \times \frac{5}{6}$$

$$E(X) = \frac{8}{6} - \frac{10}{6}$$

$$E(X) = -\frac{2}{6}$$

$$E(X) = -\frac{1}{3}$$