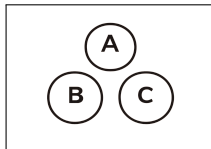


15 Discrete Distribution Expected Value Variable

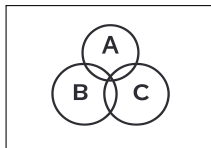
D



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

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

$$E[X] = ?$$



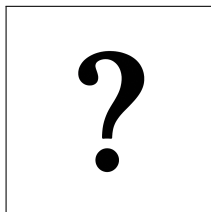
$$E[X] = \sum xP(X = x)$$

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

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

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

$$E[X] = 3.5$$



$$P(X = 2) = 1/36$$

$$P(X = 3) = 2/36$$

$$P(X = 4) = 3/36$$

$$P(X = 5) = 4/36$$

$$P(X = 6) = 5/36$$

$$P(X = 7) = 6/36$$

$$P(X = 8) = 5/36$$

$$P(X = 9) = 4/36$$

$$P(X = 10) = 3/36$$

$$P(X = 11) = 2/36$$

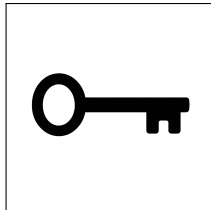
$$P(X = 12) = 1/36$$

$$N = X - 8$$

$$E(N) = ?$$

15 Discrete Distribution Expected Value Variable

D



$$P(X = 2) = 1/36$$

$$P(X = 3) = 2/36$$

$$P(X = 4) = 3/36$$

$$P(X = 5) = 4/36$$

$$P(X = 6) = 5/36$$

$$P(X = 7) = 6/36$$

$$P(X = 8) = 5/36$$

$$P(X = 9) = 4/36$$

$$P(X = 10) = 3/36$$

$$P(X = 11) = 2/36$$

$$P(X = 12) = 1/36$$

$$N = X - 8$$

$$E(N) = ?$$

$$E(X) = \sum_{x=2}^{12} x \times P(X = x)$$

$$E(X) = 2 \times \frac{1}{36} + 3 \times \frac{2}{36} + 4 \times \frac{3}{36} + 5 \times \frac{4}{36} + 6 \times \frac{5}{36} +$$

$$7 \times \frac{6}{36} + 8 \times \frac{5}{36} + 9 \times \frac{4}{36} + 10 \times \frac{3}{36} + 11 \times \frac{2}{36} + 12 \times \frac{1}{36}$$

$$E(X) = \frac{2+6+12+20+30+42+40+36+30+22+12}{36}$$

$$E(X) = \frac{252}{36} = 7$$

$$E(N) = E(X - 8) = E(X) - 8 = 7 - 8 = -1$$