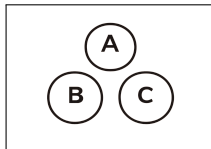


15 Discrete Distribution Expected Value Variable

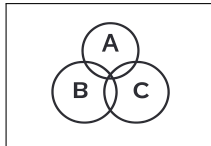
L



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

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

$$E[X] = ?$$



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

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

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

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

$$E[X] = 3.5$$



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

$$p(x) = kx$$

$$k = ?$$

$$PDF = ?$$

$$E(X) = ?$$

15 Discrete Distribution Expected Value Variable

L



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

$$P(x) = kx$$

$$k = ?$$

$$PDF = ?$$

$$E(X) = ?$$

$$\sum_{x=1}^6 kx = k(1 + 2 + 3 + 4 + 5 + 6) = k \times 21 = 1 \Rightarrow k = \frac{1}{21}$$

$$P(X = 1) = \frac{1}{21} \times 1 = \frac{1}{21}$$

$$P(X = 2) = \frac{1}{21} \times 2 = \frac{2}{21}$$

$$P(X = 3) = \frac{1}{21} \times 3 = \frac{3}{21} = \frac{1}{7}$$

$$P(X = 4) = \frac{1}{21} \times 4 = \frac{4}{21}$$

$$P(X = 5) = \frac{1}{21} \times 5 = \frac{5}{21}$$

$$P(X = 6) = \frac{1}{21} \times 6 = \frac{6}{21} = \frac{2}{7}$$

$$E(X) = \sum xp(x) = \sum_{x=1}^6 x \left(\frac{x}{21} \right) = \frac{1}{21} \sum_{x=1}^6 x^2$$

$$E(X) = \sum_{x=1}^6 x^2 = 1^2 + 2^2 + 3^2 + 4^2 + 5^2 + 6^2 = 91$$

$$E(X) = \frac{91}{21} = \frac{13}{3} \approx 4.33$$