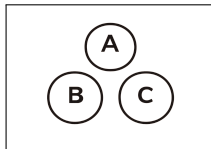


17

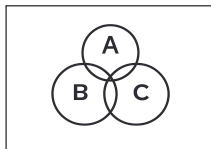
Discrete Distribution Standard Deviation

D



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

$$P(X = x) = \frac{1}{6}$$



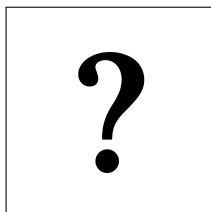
$$E(X) = \sum_{x=1}^6 x \cdot \frac{1}{6} = \frac{1+2+3+4+5+6}{6} = \frac{21}{6} = 3.5$$

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

$$\begin{aligned} \text{Var}(X) &= E(X^2) - [E(X)]^2 = \frac{91}{6} - (3.5)^2 = \frac{91}{6} - \frac{49}{4} = \\ &= \frac{182-147}{12} = \frac{35}{12} = \frac{35}{12} \end{aligned}$$

$$\text{SD}(X) = \sqrt{\text{Var}(X)} = \sqrt{\frac{35}{12}} = \sqrt{\frac{35}{12}} \approx 1.708$$

$$\text{Var}(4X + 2) = 16 \text{Var}(X)$$



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

$$N = 10$$

$$K = 7$$

$$n = 4$$

$$P(X = x) = ?$$

$$\text{Var}(X) = ?$$

17

Discrete Distribution
Standard Deviation

D



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

$$N = 10$$

$$K = 7$$

$$n = 4$$

$$P(X = x) = ?$$

$$\text{Var}(X) = ?$$

$$P(X = 1) = \frac{\binom{7}{1}\binom{3}{3}}{\binom{10}{4}} = \frac{7 \cdot 1}{210} = \frac{1}{30}$$

$$P(X = 2) = \frac{\binom{7}{2}\binom{3}{2}}{\binom{10}{4}} = \frac{21 \cdot 3}{210} = \frac{3}{10}$$

$$P(X = 3) = \frac{\binom{7}{3}\binom{3}{1}}{\binom{10}{4}} = \frac{35 \cdot 3}{210} = \frac{1}{2}$$

$$P(X = 4) = \frac{\binom{7}{4}\binom{3}{0}}{\binom{10}{4}} = \frac{35 \cdot 1}{210} = \frac{1}{6}$$

$$\text{Var}(X) = n \frac{K}{N} \left(1 - \frac{K}{N}\right) \frac{N-n}{N-1}$$

$$\text{Var}(X) = 4 \cdot \frac{7}{10} \cdot \frac{3}{10} \cdot \frac{6}{9}$$

$$\text{Var}(X) = 0.56$$