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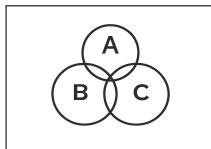
Discrete Distribution Standard Deviation

G



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

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



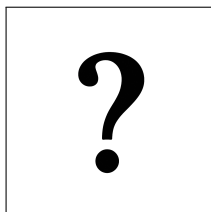
$$E(X) = \sum_{x=1}^6 x \cdot \frac{1}{6} = \frac{1+2+3+4+5+6}{6} = \frac{21}{6} = 3.5$$

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

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

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

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



$$P(X = 2) = \frac{3}{7}$$

$$P(X = -1) = \frac{4}{7}$$

$$E(X) = ?$$

$$E(X^2) = ?$$

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

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Standard Deviation

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$$P(X = 2) = \frac{3}{7}$$

$$P(X = -1) = \frac{4}{7}$$

$$E(X) = ?$$

$$E(X^2) = ?$$

$$Var(X) = ?$$

$$E(X) = 2 \cdot P(X = 2) + (-1) \cdot P(X = -1)$$

$$E(X) = 2 \cdot \frac{3}{7} - 1 \cdot \frac{4}{7}$$

$$E(X) = \frac{6-4}{7}$$

$$E(X) = \frac{2}{7}$$

$$E(X^2) = (2)^2 \cdot \frac{3}{7} + (-1)^2 \cdot \frac{4}{7}$$

$$E(X^2) = \frac{12+4}{7}$$

$$E(X^2) = \frac{16}{7}$$

$$Var(X) = E(X^2) - [E(X)]^2$$

$$Var(X) = \frac{16}{7} - \left(\frac{2}{7}\right)^2$$

$$Var(X) = \frac{16}{7} - \frac{4}{49}$$

$$Var(X) = \frac{112-4}{49}$$

$$Var(X) = \frac{108}{49}$$

$$Var(X) \approx 2.2041$$