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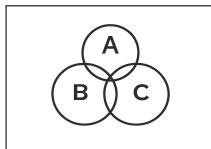
Discrete Distribution Standard Deviation

E



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

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



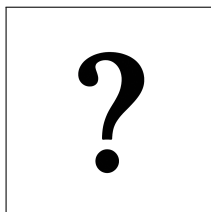
$$E(X) = \sum_{x=1}^6 x \cdot \frac{1}{6} = \frac{1+2+3+4+5+6}{6} = \frac{21}{6} = 3.5$$

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

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

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

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



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

$$p(x) = \frac{1}{30} x^2$$

$$E(X) = ?$$

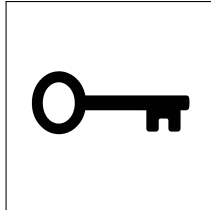
$$E(X^2) = ?$$

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

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Discrete Distribution
Standard Deviation

E



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

$$p(x) = \frac{1}{30} x^2$$

$$E(X) = \sum_{x=1}^4 x p(x)$$

$$E(X) = \sum_{x=1}^4 x \left(\frac{1}{30} x^2 \right)$$

$$E(X) = \frac{1}{30} \sum_{x=1}^4 x^3$$

$$E(X) = \frac{1+8+27+64}{30}$$

$$E(X) = \frac{100}{30}$$

$$E(X) = \frac{10}{3} \approx 3.3333$$

$$E(X^2) = \sum_{x=1}^4 x^2 p(x)$$

$$E(X^2) = \frac{1}{30} \sum_{x=1}^4 x^4$$

$$E(X^2) = \frac{1+16+81+256}{30}$$

$$E(X^2) = \frac{354}{30}$$

$$E(X^2) = \frac{59}{5} = 11.8$$

$$\text{Var}(X) = E(X^2) - [E(X)]^2$$

$$\text{Var}(X) = \frac{59}{5} - \left(\frac{10}{3} \right)^2$$

$$\text{Var}(X) = \frac{59}{5} - \frac{100}{9}$$

$$\text{Var}(X) = \frac{531-500}{45}$$

$$\text{Var}(X) = \frac{31}{45}$$

$$\text{Var}(X) \approx 0.6889$$