

# 17

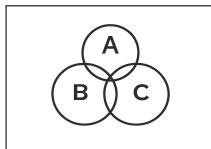
## Discrete Distribution Standard Deviation

# H



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

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



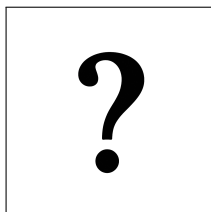
$$E(X) = \sum_{x=1}^6 x \cdot \frac{1}{6} = \frac{1+2+3+4+5+6}{6} = \frac{21}{6} = 3.5$$

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

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

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

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



$$E(X = -4) = 0.03$$

$$E(X = -1) = 0.40$$

$$E(X = 4) = 0.30$$

$$E(X) = ?$$

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

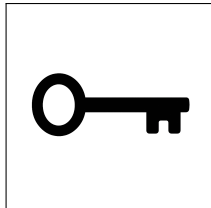
$$\text{Var}(X) = ?$$

$$\sigma_X = ?$$

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$$E(X = -4) = 0.03$$

$$E(X = -1) = 0.40$$

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$$E(X) = ?$$

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

$$Var(X) = ?$$

$$\sigma_X = ?$$

$$E(X) = \sum_x x p(x) = -4 \cdot 0.3 + 1 \cdot 0.4 + 4 \cdot 0.3$$

$$E(X) = \sum_x x p(x) = -1.2 + 0.4 + 1.2 = 0.4$$

$$E(X^2) = \sum_x x^2 p(x) = (-4)^2 \cdot 0.3 + 1^2 \cdot 0.4 + 4^2 \cdot 0.3$$

$$E(X^2) = 16 \cdot 0.3 + 1 \cdot 0.4 + 16 \cdot 0.3$$

$$E(X^2) = 4.8 + 0.4 + 4.8 = 10.0$$

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

$$Var(X) = 10.0 - (0.4)^2$$

$$Var(X) = 10.0 - 0.16$$

$$Var(X) = 9.84$$

$$\sigma_X = \sqrt{Var(X)}$$

$$\sigma_X = \sqrt{9.84}$$

$$\sigma_X \approx 3.138$$