

17

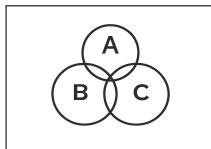
Discrete Distribution Standard Deviation

K



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

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



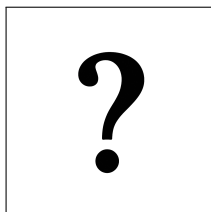
$$E(X) = \sum_{x=1}^6 x \cdot \frac{1}{6} = \frac{1+2+3+4+5+6}{6} = \frac{21}{6} = 3.5$$

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

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

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

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



$$P(X = 4) = 0.1$$

$$P(X = 5) = 0.3$$

$$P(X = 6) = 0.3$$

$$P(X = 8) = 0.2$$

$$P(X = 9) = 0.1$$

$$E(X) = ?$$

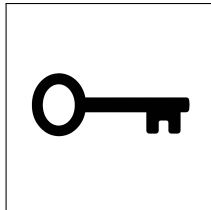
$$E(X^2) = ?$$

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

17

Discrete Distribution
Standard Deviation

K



$$P(X = 4) = 0.1$$

$$P(X = 5) = 0.3$$

$$P(X = 6) = 0.3$$

$$P(X = 8) = 0.2$$

$$P(X = 9) = 0.1$$

$$E(X) = ?$$

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

$$Var(X) = ?$$

$$E(X) = \sum x, P(X = x)$$

$$E(X) = 4(0.1) + 5(0.3) + 6(0.3) + 8(0.2) + 9(0.1)$$

$$E(X) = 0.4 + 1.5 + 1.8 + 1.6 + 0.9$$

$$E(X) = 6.2$$

$$E(X^2) = 4^2(0.1) + 5^2(0.3) + 6^2(0.3) + 8^2(0.2) + 9^2(0.1)$$

$$E(X^2) = 16(0.1) + 25(0.3) + 36(0.3) + 64(0.2) + 81(0.1)$$

$$E(X^2) = 1.6 + 7.5 + 10.8 + 12.8 + 8.1$$

$$E(X^2) = 40.8$$

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

$$Var(X) = 40.8 - (6.2)^2$$

$$Var(X) = 40.8 - 38.44$$

$$Var(X) = \boxed{2.36}$$