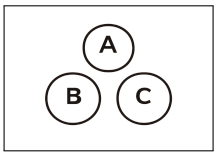
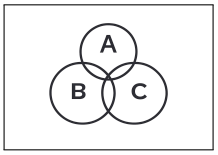
17 Discrete Distribution Standard Deviation M



$X = \{1, 2, 3, 4, 5, 6\}$
$P(X = x) = \frac{1}{6}$



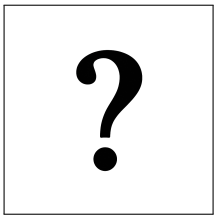
$E(X) = \sum_{x=1}^{6} x \cdot \frac{1}{6} = \frac{1+2+3+4+5+6}{6} = \frac{21}{6} = 3.5$

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

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

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

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

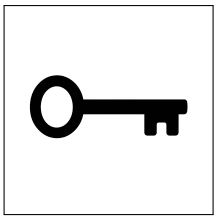


$P(0 < X \leq 20) = 0.06 : P(20 < X \leq 30) = 0.18$
$P(30 < X \leq 40) = 0.26 : P(40 < X \leq 50) = 0.22$
$P(50 < X \leq 60) = 0.14 : P(60 < X \leq 70) = 0.06$
$P(70 < X \leq 80) = 0.04 : P(80 < X \leq 90) = 0.04$
$P(X > 90) = 0.00$

$Y(X < 50) = 0 \rightarrow P(Y = 0) = 0.72$
$Y(50 \leq X < 60) = 300 \rightarrow P(Y = 300) = 0.14$
$Y(60 \leq X > 70) = 600 \rightarrow P(Y = 600) = 0.06$
$Y(X \geq 70) = 700 \rightarrow P(Y = 700) = 0.08$

$E(Y) = ? : E(Y^2) = ? : Var(Y) = ? : \sigma_Y = ?$

17 Discrete Distribution Standard Deviation M



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$E(Y) = ? : E(Y^2) = ? : Var(Y) = ? : \sigma_Y = ?$

$E(Y) = 0 \cdot 0.72 + 300 \cdot 0.14 + 600 \cdot 0.06 + 700 \cdot 0.08$
$E(Y) = 42 + 36 + 56$
$E(Y) = 134$

$E(Y^2) = 0^2 \cdot 0.72 + 300^2 \cdot 0.14 + 600^2 \cdot 0.06 + 700^2 \cdot 0.08$
$E(Y^2) = 90{,}000 \cdot 0.14 + 360{,}000 \cdot 0.06 + 490{,}000 \cdot 0.08$
$E(Y^2) = 12{,}600 + 21{,}600 + 39{,}200$
$E(Y^2) = 73{,}400$

$Var(Y) = E(Y^2) - [E(Y)]^2$
$Var(Y) = 73{,}400 - (134)^2$
$Var(Y) = 73{,}400 - 17{,}956$
$Var(Y) = 55{,}444.$

$\sigma_Y = \sqrt{\text{Var}(Y)}$
$\sigma_Y = \sqrt{55{,}444}$
$\sigma_Y \approx 235.5$