Variance Example

Given the pmf of X compute the $\text{Var}(X)$.

X	1	2	3	4	5	6
$p(x)$	0.3	0.25	0.15	0.05	0.1	0.15

$$E(X) = \sum_{i=1}^{6} x_i p(x_i) = 1\times 0.3 + 2\times 0.25 + 3\times 0.15 + 4\times 0.05 + 5\times 0.1 + 6\times 0.15$$

$$= 2.85$$

$$\text{Var}(X) = \sum_{x=1}^{6} (x - 2.85)^2 \cdot p(x)$$

$$= 3.2275$$

Shortcut formula for variance

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

$$E[X^2] = \sum_{i=1}^{6} x^2 p(x) = 1^2 \cdot 0.3 + 2^2 \cdot 0.25 + \ldots + 6^2 \cdot 0.15$$

$$= 11.35$$

$$\text{VAR}(X) = 11.35 - 2.85^2 = 3.2275$$