expected value

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The expected value rule:

expected value

The expected value, is the (probability) weighted average of the possible outcomes

$$E(X) = \sum_x x \cdot P(X = x)$$

the center of gravity of the PMF

The expected value rule:

Let X be a random variable with PMF $f(x)$ and let $g(X)$ be a function of X. Then,

$$E[g(X)] = \sum_x g(x) \cdot f(x)$$

variance

The variance is given by

$$V(X) = E[(X - E(X))^2 = \sum_x (x - E(X))^2 \cdot P(X = x) = E[X^2] - E[X]^2$$

the standard deviation $\sqrt{V(X)}$ is usually easier to interpret

- The variance is always nonnegative
- We can find $V(X)$ by calculating the mean of $Z = (X - E[X])^2$ via the expected value rule
- When computing the variance often we use a different (equivalent) form of the variance equation:

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