

Mean of a Random Variable

The measure of the central location of a random variable is called the *expected value* or *mean* of that random variable. It is calculated as the weighted mean of the values where the weights are their corresponding probabilities.

Example 1.9

Let X be the number of heads obtained in tossing a coin. Find the expected value of the number of heads.

Solution.

Recall from lesson 1 the probability mass function for the number of heads in tossing a coin.

x	0	1
$P(X = x)$	$\frac{1}{2}$	$\frac{1}{2}$

The expected value or mean of X is calculated as

$$E[X] = \mu_X = \sum_{i=1}^k x_i \cdot P(x_i) = 0 \cdot \frac{1}{2} + 1 \cdot \frac{1}{2} = \frac{1}{2}.$$

Thus, the expected number of heads is $\frac{1}{2}$.

Note that the expected value of the random variable X need not be one of the possible values of X . The result is the long-run average of X . This means that if you toss a coin several number of times or an infinite number of times, the average of the number of heads obtained is $\frac{1}{2}$.



