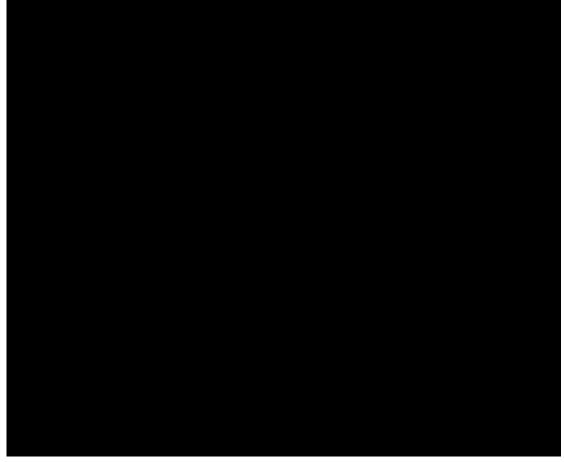
# **Mean of a Random Variable**

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.



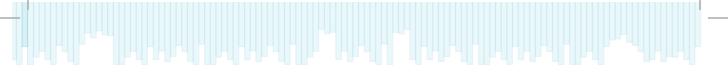
## Example 1.9

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  $\frac{1}{2}$ .



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