



**Random Variable**

A **random variable** associates a numerical value with each outcome of a random experiment/trial.

**Example 1:** Flipping a coin

**Example 2:** Flipping 2 coins

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**Discrete Variables vs. Continuous Variables**

A random variable is **discrete** if it has either a finite number of values OR infinitely many values that can be arranged in a sequence.

A random variable is **continuous** if it represents some measurement on a continuous scale and therefore, capable of assuming all values in an interval.

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**Probability Distribution**

The probability distribution of a discrete random variable is a list of all its distinct numerical values along with their associated probabilities.

$x$	$f(x)$
$x_1$	$f(x_1)$
$x_2$	$f(x_2)$
$\vdots$	$\vdots$
$x_3$	$f(x_3)$

**Example 3:**  $X$  = the outcome of a fair six-sided dice

## Big $X$ vs. Small $x$

### Example 4:

A balanced (fair) coin is tossed twice. Let  $X$  denote the number of heads. Construct the probability distribution of  $X$ .

### Example 5:

We repeat example 4 with a loaded coin with the probability of getting a head is 0.3. Construct the probability distribution of  $X$ .

### Example 6:

Let  $X$  = the number of pizza Alex orders per week.

$x$	$f(x)$
0	0.05
1	0.1
2	0.2
3	0.35
4	
5	0.1

What is the probability that Alex orders 4 pizzas this week?

What is the probability Alex orders more than 3 pizzas this week?

What is the probability Alex orders at most 2 pizzas this week?

What is the probability Alex orders at least 1 pizza this week?