Random Variables:

A random variable is a measurable function defined on a probability space that maps from the sample space to the real numbers.

In simple words random variable is a mapping from an event to $\mathbb{R}$

Examples:

(1) Event of tossing 3 coins $(|S| = 2^3 = 8)$

Random Variable ← X = number of heads

$P(X=0) = 1/2^3$

$P(X=1) = {}^3C_1\left(\frac{1}{2}\cdot\frac{1}{2^2}\right)$

$P(X=2) = {}^3C_2\left(1/2^2 \cdot 1/2\right)$

$P(X=3) = 1/2^3$

$X \in \{0,1,2,3\} \Rightarrow$ Discrete r.v

(2) X = amount of rainfal on a given day.

$P(X \geq 2\,cm) = 0.95$

$P(x \geq 1.5cm) = 0.96$

$P(x \leq 1cm) = 0.99$

$X \in [0,\infty) \Rightarrow$ Continuous R.V

Discrete r.v	Continuous r.v
# of possible values a r.v can take is countable	Set of possible outcomes are not countable
$X \in \{1,2,3,4,5,6\}$	$X \in [0,1]$