

man and his variables

random variable

range of a random variable
function of a random variable

random variables

Given an experiment and the sample space Ω , a **random variable** is a function mapping an outcome ($\omega \in \Omega$) into a real number, i.e.

$$X : \omega \in \Omega \rightarrow X(\omega) \in (-\infty, \infty)$$

- We use a capital letter X to denote a random variable
- The values of a random variable will be denoted with a lower case letter x
- The **range of a random variable** is the set of values it can take
- a **function of a random variable** is another mapping from the sample space to real numbers, so another random variable

random variables

example 

Toss a coin 3 times: the sample space is $\Omega : \{H,T\} \times \{H,T\} \times \{H,T\}$

Define the random variable: $X =$ the number of heads

What is the probability of each outcome of X ?

Outcome (ω)	HHH	HTH	THH	HHT	HTT	THT	TTH	TTT
$X(\omega)$	3	2	2	2	1	1	1	0

$$P(X = 3) = \frac{1}{8}$$

$$P(X = 1) = \frac{3}{8}$$

$$P(X = 2) = \frac{3}{8}$$

$$P(X = 0) = \frac{1}{8}$$