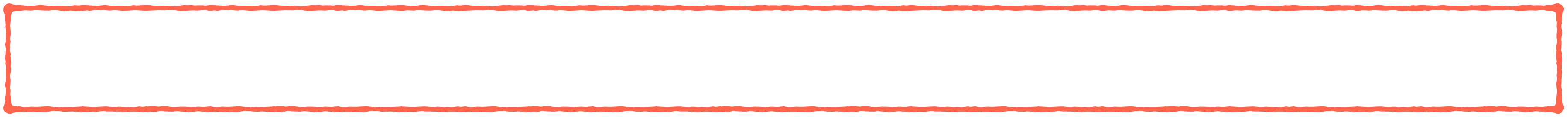


discrete random variables: probability mass function



probability mass function



discrete random variables: probability mass function

A random variable is discrete if its range is a countable (finite or infinite) set.

If X is a discrete random variable, the function given by $f(x) = P(X = x)$ for each x within the range of X is called the probability distribution of X , also called **probability mass function** (pmf)

A function can serve as the probability distribution of a discrete random variable X if and only if its values, $f(x)$, satisfy the conditions:

- $f(x) \geq 0$ for each value within its domain
- $\sum_x f(x) = 1$ where the sum is over all the x values within its domain.

discrete random variables: probability mass function

example (cont'd...)



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 distribution of X ?

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

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

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

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

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