random variable

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Defines	discrete random variable
Defines	continuous random variable
Defines	law of a random variable

If $(\Omega, \mathcal{A}, P)$ is a probability space, then a **random variable** on Ω is a measurable function $X : (\Omega, \mathcal{A}) \to S$ to a measurable space S (frequently taken to be the real numbers with the standard measure). The *law* of a random variable is the probability measure $PX^{-1} : S \to \mathbb{R}$ defined by $PX^{-1}(s) = P(X^{-1}(s))$.

A random variable X is said to be *discrete* if the set $\{X(\omega) : \omega \in \Omega\}$ (i.e. the range of X) is finite or countable. A more general version of this definition is as follows: A random variable X is discrete if there is a countable subset B of the range of X such that $P(X \in B) = 1$ (Note that, as a countable subset of $\mathbb{R}$, B is measurable).

A random variable Y is said to be if it has a cumulative distribution function which is `http://planetmath.org/AbsolutelyContinuousFunction2`absolutely continuous.

Example:

Consider the event of throwing a coin. Thus, $\Omega = \{H, T\}$ where H is the event in which the coin falls head and T the event in which falls tails. Let X =number of tails in the experiment. Then X is a (discrete) random variable.