

## Topic #3: Random variable

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A random variable is a mathematical function that maps outcomes of random experiments to numbers. It can be thought of as the numeric result of operating a non-deterministic mechanism or performing a non-deterministic experiment to generate a random result. For example, a random variable can be used to describe the process of rolling a fair die and the possible outcomes  $\{ 1, 2, 3, 4, 5, 6 \}$ . Another random variable might describe the possible outcomes of picking a random person and measuring his or her height.

Unlike the common practice with other mathematical variables, a random variable cannot be assigned a value; a random variable does not describe the actual outcome of a particular experiment, but rather describes the possible, as-yet-undetermined outcomes in terms of real numbers.

Although such simple examples as rolling a die and measuring heights allow easy visualisation of the practical use of random variables, their mathematical construction allows mathematicians the convenience of dealing with much measure-theoretic probability theory in the more familiar domain of real-valued functions. Conversely, the concept also places experiments involving real-valued outcomes firmly within the measure-theoretic framework.