## Probabilities :

## définitions of the Oxford concise dictionary of Mathematics

**probability** The probability of an *event $A$, denoted by $\Pr(A)$, is a measure of the possibility of the event occurring as the result of an experiment. For any event $A$, $0 \leq \Pr(A) \leq 1$. If $A$ never occurs, then $\Pr(A) = 0$; if $A$ always occurs, then $\Pr(A) = 1$. If an experiment could be repeated $n$ times and the event $A$ occurs $m$ times, then the limit of $m/n$ as $n \to \infty$ is equal to $\Pr(A)$.

If the *sample space $S$ is finite and the possible outcomes are all equally likely, then the probability of the event $A$ is equal to $n(A)/n(S)$, where $n(A)$ and $n(S)$ denote the number of elements in $A$ and $S$. The probability that a randomly selected element from a finite population belongs to a certain category is equal to the proportion of the population belonging to that category.

The probability that a discrete *random variable $X$ takes the value $x_i$ is denoted by $\Pr(X = x_i)$. The probability that a continuous random variable $X$ takes a value less than or equal to $x$ is denoted by $\Pr(X \leq x)$. This notation may be extended in a natural way.

*See also* CONDITIONAL PROBABILITY, PRIOR PROBABILITY and POSTERIOR PROBABILITY.

**conditional probability** For two events $A$ and $B$, the probability that $A$ occurs, given that $B$ has occurred, is denoted by $\Pr(A \mid B)$, read as 'the probability of $A$ given $B$'. This is called a conditional probability. Provided that Pr $(B)$ is not zero, $\Pr(A|B) = \Pr(A \cap B)/\Pr(B)$. This result is often useful in the following form: $\Pr(A \cap B) = \Pr(B)\ \Pr(A|B)$. If $A$ and $B$ are *independent events, $\Pr(A \mid B) = \Pr(A)$, and this gives the product law for independent events: $\Pr(A \cap B) = \Pr(A)\ \Pr(B)$. *See also* FALSE POSITIVE.