

# Notation Reference

## Core Probability

Notation	Meaning
$E$	Capital letters can denote events
$A$	Sometimes they denote sets
$ E $	Size of an event or set
$E^C$	Complement of an event or set
$EF$	And of events (aka intersection)
$E \text{ and } F$	And of events (aka intersection)
$E \cap F$	And of events (aka intersection)
$E \text{ or } F$	Or of events (aka union)
$E \cup F$	Or of events (aka union)
$\text{count}(E)$	The number of times that $E$ occurs
$P(E)$	The probability of an event $E$
$P(E F)$	The conditional probability of an event $E$ given $F$
$P(E, F)$	The probability of event $E$ and $F$
$P(E F, G)$	The conditional probability of an event $E$ given both $F$ and $G$
$n!$	$n$ factorial
$\binom{n}{k}$	Binomial coefficient
$\binom{n}{r_1, r_2, r_3}$	<a href="#">Multinomial coefficient</a>

## Random Variables

Notation	Meaning
$x$	Lower case letters denote regular variables
$X$	Capital letters are used to denote random variables
$K$	Capital $K$ is reserved for constants
$E[X]$	Expectation of $X$
$\text{Var}(X)$	Variance of $X$

Notation	Meaning
$P(X = x)$	Probability mass function (PMF) of $X$ , evaluated at $x$
$P(x)$	Probability mass function (PMF) of $X$ , evaluated at $x$
$f(X = x)$	Probability density function (PDF) of $X$ , evaluated at $x$
$f(x)$	Probability density function (PDF) of $X$ , evaluated at $x$
$f(X = x, Y = y)$	Joint probability density
$f(X = x Y = y)$	Conditional probability density
$F_X(x)$ or $F(x)$	Cumulative distribution function (CDF) of $X$
IID	Independent and Identically Distributed

## Parametric Distributions

Notation	Meaning
$X \sim \text{Bern}(p)$	$X$ is a Bernoulli random variable
$X \sim \text{Bin}(n, p)$	$X$ is a Binomial random variable
$X \sim \text{Poi}(p)$	$X$ is a Poisson random variable
$X \sim \text{Geo}(p)$	$X$ is a Geometric random variable
$X \sim \text{NegBin}(r, p)$	$X$ is a Negative Binomial random variable
$X \sim \text{Uni}(a, b)$	$X$ is a Uniform random variable
$X \sim \text{Exp}(\lambda)$	$X$ is a Exponential random variable
$X \sim \text{Beta}(a, b)$	$X$ is a Beta random variable