Probability And Statistics symbols

Symbol	Symbol Name	Meaning / definition	Example
$P(A)$	probability function	probability of event A	$P(A) = 0.5$
$P(A \cap B)$	probability of events intersection	probability that of events A and B	$P(A \cap B) = 0.5$
$P(A \cup B)$	probability of events union	probability that of events A or B	$P(A \cup B) = 0.5$
$P(A \mid B)$	conditional probability function	probability of event A given event B occured	$P(A \mid B) = 0.3$
$f(x)$	probability density function (pdf)	$P(a \le x \le b) = \int f(x)\,dx$	
$F(x)$	cumulative distribution function (cdf)	$F(x) = P(X \le x)$	
μ	population mean	mean of population values	$\mu = 10$
$E(X)$	Expection value	expected value of random variable X	$E(X) = 10$
$E(X \mid Y)$	conditional expectation	expected value of random variable X given Y	$E(X \mid Y{=}2) = 5$
$var(X)$	variance	variance of random variable X	$var(X) = 4$
σ^2	Variance	variance of population values	$\sigma^2 = 4$
$std(X)$	Standard deviation	standard deviation of random variable X	$std(X) = 2$

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σ_X	Standard deviation	standard deviation value of random variable X	$\sigma_X = 2$
$\tilde{x}$	Median	middle value of random variable x	$\tilde{x} = 5$
$cov(X,Y)$	covariance	covariance of random variables X and Y	$cov(X,Y) = 4$
$corr(X,Y)$	correlation	correlation of random variables X and Y	$corr(X,Y) = 0.6$
$\rho_{X,Y}$	correlation	correlation of random variables X and Y	$\rho_{X,Y} = 0.6$
$\sum$	summation	summation - sum of all values in range of series	$\displaystyle\sum_{i=1}^{4} x_i = x_1 + x_2 + x_3 + x_4$
$\sum\sum$	double summation	double summation	$\displaystyle\sum_{j=1}^{2}\sum_{i=1}^{8} x_{i,j} = \sum_{i=1}^{8} x_{i,1} + \sum_{i=1}^{8} x_{i,2}$
Mo	Mode	value that occurs most frequently in population	
MR	mid-range	$MR = (x_{max}+x_{min})/2$	
Md	sample median	half the population is below this value	
Q_1	lower / first quartile	25% of population are below this value	
Q_2	median / second quartile	50% of population are below this value = median of samples	

Symbol	Symbol Name	Meaning / definition	Example
Q_3	upper / third quartile	75% of population are below this value	
x	sample mean	average / arithmetic mean	$x = (2+5+9) / 3 = 5.333$
s^2	sample variance	population samples variance estimator	$s^2 = 4$
s	sample standard deviation	population samples standard deviation estimator	$s = 2$
z_x	standard score	$z_x = (x\text{-}x) / s_x$	
$X \sim$	Distribution of X	distribution of random variable X	$X \sim N(0,3)$
$N(\mu,\sigma^2)$	Normal distribution	gaussian distribution	$X \sim N(0,3)$
$U(a,b)$	uniform distribution	equal probability in range a,b	$X \sim U(0,3)$
$exp(\lambda)$	exponential distribution	$f(x) = \lambda e^{-\lambda x}$, $x \geq 0$	
$gamma(c, \lambda)$	gamma distribution	$f(x) = \lambda\, c\, x^{c\text{-}1} e^{-\lambda x} / \Gamma(c)$, $x \geq 0$	
$\chi^2(k)$	chi-square distribution	$f(x) = x^{k/2\text{-}1} e^{-x/2} / (2^{k/2}\Gamma(k/2))$	
$F(k_1, k_2)$	F distribution		
$Bin(n,p)$	binomial distribution	$f(k) = {}_nC_k\, p^k(1\text{-}p)^{n\text{-}k}$	
$Poisson(\lambda)$	Poisson distribution	$f(k) = \lambda^k e^{-\lambda} / k!$	
$Geom(p)$	geometric	$f(k) = p(1\text{-}p)^k$	

Symbol	Symbol Name	Meaning / definition	Example
	distribution		
$HG(N,K,n)$	hyper-geometric distribution		
$Bern(p)$	Bernoulli distribution		