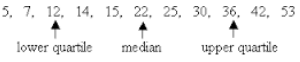
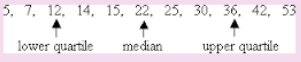
Math Statistic Symbols with Examples

Symbol	Symbol Name	Symbol Meaning	Example
s	Sample Standard Deviation	population samples standard deviation estimator	$s = 2$
z_x	Standard Score	$z_x = (x-\bar{x}) / s_x$	$= \frac{\lvert 1.15 - 1.30 \rvert}{0.05} = \frac{0.15}{0.05} = 3$
$X \sim$	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	$f(x) = \lambda e^{-\lambda x}$, $x \geq 0$	$W_q = \frac{\lambda}{\mu(\mu-\lambda)} = \frac{6}{10(10-6)} = \frac{3}{20}$ hr. or 9 minutes
$gamma(c, \lambda)$	Gamma Distribution	Gamma Distribution	$f(x) = \lambda\, c\, x^{c-1} e^{-\lambda x} / \Gamma(c)$, $x \geq 0$
$\chi^2(k)$	Chi-Square Distribution	Chi-Square Distribution	$f(x) = x^{k/2-1} e^{-x/2} / \left(2^{k/2}\, \Gamma(k/2) \right)$
$F(k_1, k_2)$	F Distribution	F Distribution	$f(x; d_1, d_2) = \frac{\sqrt{\frac{(d_1 x)^{d_1}\, d_2^{d_2}}{(d_1 x + d_2)^{d_1+d_2}}}}{x\, \mathrm{B}\left(\frac{d_1}{2}, \frac{d_2}{2}\right)}$
$Bin(n,p)$	Binomial Distribution	Binomial Distribution	$f(k) = {}_nC_k p^k (1-p)^{n-k}$
$Poisson(\lambda)$	Poisson distribution	Poisson distribution	$f(k) = \lambda^k e^{-\lambda} / k!$
$Geom(p)$	Geometric Distribution	Geometric Distribution	$f(k) = p(1-p)^k$
$HG(N,K,n)$	Hyper-Geometric Distribution	Hyper-Geometric Distribution	$P(X = 2 \mid 3, 10, 4) = \frac{\binom{A}{X}\binom{N-A}{n-X}}{\binom{N}{n}} = \frac{\binom{4}{2}\binom{6}{1}}{\binom{10}{3}} = \frac{(6)(6)}{120} = 0.3$
$Bern(p)$	Bernoulli Distribution	Bernoulli Distribution	$f(k;p) = p^k (1-p)^{1-k}$ for $k \in \{0,1\}$. The Bernoulli distribution is a special case of the binomial distribution with $n = 1$
$P(A)$	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	$P(A \cup B) = 0.5$

Symbol	Symbol Name	Symbol Meaning	Example
$P(A \mid B)$	Conditional Probability Function	probability of event A given event B occured	$P(A \mid B) = 0.3$
$f(x)$	Probability Density Function (PDF)	Probability Density Function (PDF)	$P(a \le x \le b) = \int f(x)\,dx$
$F(x)$	Cumulative Distribution Function (CDF)	Cumulative Distribution Function (CDF)	$F(x) = P(X \le x)$
μ	Population Mean	mean of population values	$\mu = 10$
$E(X)$	Expectation 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	$std(X) = 2$
σ_X	Standard Deviation	standard deviation value of random variable X	$\sigma_X = 2$
$\tilde{x}$	Median	middle value of random variable x	
$cov(X,Y)$	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	$\rho_{X,Y} = 0.6$
Σ	Summation	summation - sum of all values in range of series	$\sum_{i=1}^{4} x_i = x_1 + x_2 + x_3 + x_4$
$\Sigma\Sigma$	Double Summation	double summation	$\sum_{j=1}^{2}\sum_{i=1}^{8} x_{i,j} = \sum_{i=1}^{8} x_{i,1} + \sum_{i=1}^{8} x_{i,2}$
Mo	Mode	value that occurs most frequently in population	
MR	Mid-Range	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	
Q_3	Upper / Third Guartile	75% of population are below this value	
$\bar{x}$	Sample Mean	average / arithmetic mean	$\bar{x} = (2+5+9) / 3 = 5.333$
s^2	Sample Variance	population samples variance estimator	$s^2 = 4$