Statistics Symbols

Alphabetical Statistical Symbols

Symbol	Text Equivalent	Meaning	Formula	Link to Glossary (if appropriate)
a		Y- intercept of least square regression line	$a = \bar{y} - b\bar{x}$, for line $y = a + bx$	Regression: y on x
b		Slope of least squares regression line	$b = \frac{\Sigma(x-\bar{x})(y-\bar{y})}{\Sigma(x-\bar{x})^2}$ for line $y = a + bx$	Regression: y on x
$B(n,p)$	Binomial distribution with parameters n and p	Discrete probability distribution for the probability of number of successes in n independent random trials under the identical conditions.	If X follows $B(n,p)$ then, $P(X = r) = {}^{n}c_r\, p^r (1-p)^{n-r}$, Where, $0 < p < 1$, r = 0,1,2, …….,n,	Binomial Distribution
c		Confidence level	$c = P(-Z_c < \text{Normal}(0,1) < Z_c)$	Confidence interval
$^{n}C_r$	n-c-r	Combinations (number of combinations of n objects taken r at a time)	${}^{n}c_r = \frac{n!}{r!(n-r)!}$, where $n \geq r$	

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$C_{n,r}$	n-c-r	Combinations (number of combinations of n objects taken r at a time)	$C_{n,r} = \frac{n!}{r!(n-r)!}$, where $n \geq r$	
$\mathrm{Cov}(X,Y)$	Covariance between X and Y	Covariance between X & Y	$\mathrm{Cov}\ (X) = E[(X - E(X))(Y - E(Y))]$	
CV		Coefficient of variation	$CV = \frac{\text{Standard Deviation}}{\text{Arithmetic mean}}$	
df		Degree(s) of freedom		
E		Maximal error tolerance	$E = z_c \frac{\sigma}{\sqrt{n}}$ for large samples	
E (f(x))	Expected value of f(x)		$E\big(f(x)\big) = \sum f(x)P(x)$	
f		Frequency	$f =$ number of times score.	
F		F-distribution variable	$F = \frac{x_1^2/n_1}{x_2^2/n_2}$ where n_1 and n_2 are the corresponding degrees of freedom.	F-distribution, Hypothesis testing for equality of 2 variances.
$F(x)$ or F_x		Distribution function	$F_x = \int_{-\infty}^{x} f_x\, dx$.	
f(x) or f_x		Probability mass function	Depends on the distribution. $f_x \geq 0$ & $\int_x f_x dx = 1$	
H_0	H-naught	Null hypothesis	The null hypothesis is the hypothesis about the population parameter.	Testing of hypothesis

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H_1	H-one	Alternate hypothesis	An alternate hypothesis is constructed in such a way that it is the one to be accepted when the null hypothesis must be rejected.	Testing of hypothesis
IQR		Interquartile range	$\mathrm{IQR} = Q_3 - Q_1$	Measures of central tendency.
MS	M-S	Mean square	$\mathrm{MS} = \frac{\mathrm{SS}}{\mathrm{df}}$	Analysis of variance (ANOVA)
n		Sample size.	$n =$ number of units in a sample.	
N		Population size	$N =$ Number of units in the population.	
$P_{n,r}$	n-p-r	Permutation (number of ways to arrange in order n distinct objects taking them r at a time)	$P_{n,r} = \frac{n!}{(n-r)!}$ where $n \geq r$	
${}_nP_r$	n-p-r	Permutation (number of ways to arrange in order n distinct objects taking them r at a time)	${}_nP_r = \frac{n!}{(n-r)!}$, where $n \geq r$	
$\hat{p}$	p-hat	Sample proportion	$\hat{p} = \frac{\text{number of success}}{\text{number of trials}}$	Binomial distribution
$P(A\|B)$	Probability of A given B	Conditional probability	$P(A\|B) = \frac{P(A \cap B)}{P(B)}$	
$P(x)$	Probability of x	Probability of x	$P(x) = \frac{\text{No.of favorable outcomes}}{\text{Total no. of outcomes}}$	
p-value		The attained	P value is the smallest level of	

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		level of significance.	significance for which the observed sample statistic tells us to reject the null hypothesis.	
Q		Probability of not happening of the event	$q = 1 - p$	
Q_1	Q-one	First quartile	$Q1 =$ Median of the lower half of the data that is data below median.	Measures of central tendency
Q_2	Q-two	Second quartile Or Median	$Q2 =$ Central value of an ordered data.	Measures of central tendency
Q_3	Q-three	Third quartile	$Q3 =$ Median of the upper half of the data that is data above the median.	Measures of central tendency
R		Sample Correlation coefficient	$r = \frac{\text{Co variance}(X,Y)}{[SD(X)]*[SD(Y)]}$	
r^2	r-square	Coefficient of determination	$r^2 = (\text{Correlation coefficient})^2$	
R^2	r-square	Multiple correlation coefficient	$R^2 = 1 - \frac{\text{mean square error}}{S_y^2}$	
S		Sample standard deviation	$s = \sqrt{\frac{\Sigma(x-\bar{x})^2}{n-1}}$ for ungrouped data. $s = \sqrt{\frac{\Sigma f(x-\bar{x})^2}{(\Sigma f)-1}}$ for grouped data.	Measures of dispersion
S^2	S-square	Sample variance	$S^2 = \frac{\Sigma(x-\bar{x})^2}{n-1}$ for ungrouped data. $S^2 = \frac{\Sigma f(x-\bar{x})^2}{(\Sigma f)-1}$ for grouped data.	Measures of dispersion
S_e^2	s-e- square	Error variance	$S_e^2 = \frac{\text{sum of squares of residuals}}{n}$	

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SD		Sample Standard deviation	$s = \sqrt{\frac{\sum (x-\bar{x})^2}{n-1}}$ for ungrouped data. $s = \sqrt{\frac{\sum f(x-\bar{x})^2}{(\sum f)-1}}$ for grouped data.	
sk_b		Bowley's coefficient of skewness	$sk_b = \frac{(Q_3-Q_2)-(Q_2-Q_1)}{Q_3-Q_1}$	Measures of skew ness
sk_p		Pearson's coefficient of skewness	$sk_p = \frac{\text{Mean}-\text{Mode}}{\text{Standard Deviation}}$	Measures of skew ness
SS_x		Sum of squares	$SS_x = \sum (x-\bar{x})^2$ for ungrouped data $SS_x = \sum f(x-\bar{x})^2$ for grouped data	
t		Student's t variable	$t = \frac{\text{Normal}(0,1)}{\sqrt{\chi_n^2/n}}$	t-distribution
t_c	t critical	The critical value for a confidence level c.	$t_c =$ Number such that the area under the t distribution for a given number of degrees of freedom falling between $-t_c$ and t_c is equal to c.	Testing of hypothesis
Var(X)	Variance of X	Variance of X	$\text{Var}(X) = E(X-\mu)^2$	
X		Independent variable or explanatory variable in regression analysis	Eg. In the study of, yield obtained & the irrigation level, independent variable is, $X =$ Irrigation level.	
$\bar{x}$	x-bar	Arithmetic mean or Average of X scores.	$\bar{x} = \frac{\sum x}{n}$ for ungrouped data. $\bar{x} = \frac{\sum fx}{\sum f}$ for grouped data	Measures of central tendency
y		Dependent variable or response	Eg. In the study of, yield obtained & the irrigation level, dependent variable is, $Y =$ Yield obtained.	

Symbol	Text Equivalent	Meaning	Formula	Link to Glossary (if appropriate)
		variable in regression analysis		
Z	Z-score	Standard normal variable (Normal variable with mean = 0 & SD = 1)	$z = \frac{X-\mu}{\sigma}$, where X follows Normal (μ, σ).	Standard normal distribution
z_c	z critical	The critical value for a confidence level c.	$z_c =$ Number such that the area under the standard normal curve falling between $-z_c$ and z_c is equal to c.	Testing of hypothesis Confidence interval

Greek Statistical Symbols

Symbol	Text Equivalent	Meaning	Formula	Link to Glossary (if appropriate)
$\propto$	Alpha	Type I error or Level of Significance	$\propto = P$ [Rejecting the null hypothesis | Null hypothesis is true] .	Hypothesis Testing
β	Beta	Type II error or Power of the test	$\beta = P$ [Accepting the null hypothesis | Null hypothesis is False].	Hypothesis Testing
$\in$	Epsilon	"Error Term" in regression/statistics; more generally used to denote an arbitrarily small positive number	$y = \beta_0 + \beta_1 * x + \in$	Regression
χ^2	Chi-square	Chi-square distribution	$\chi^2 =$ Sum of n independent Standard normal variables	Chi-square distribution

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χ^2	Chi-square	Chi-square distribution	$\chi^2 = \sum \frac{(O-E)^2}{E}$ where O is the observed frequency and E is the expected frequency. Or $\chi^2 = \frac{(n-1)s^2}{\sigma^2}$ (?)	Goodness of fit test
Γ (n)	Gamma-n	Gamma function	$\Gamma(n) = (n-1)!$	
λ	Lambda	Parameter used for Poisson distribution	$\lambda =$ Mean of Poisson distribution	Poisson distribution
μ	Mu	Arithmetic mean or Average of the population	$\mu = \frac{\sum x}{N}$ $\mu = E(X) = \sum xP(x)$	
μ_r	Mu-r	r^{th} central moment	$\mu_r = E[(X-\mu)^r]$	Measures of central tendency.
μ_r'	Mu-r-dash	r^{th} Raw moment	$\mu_r' = E(X^r)$	Measures of central tendency.
ρ	Rho	Population correlation coefficient	$\rho = \frac{Covariance(X,Y)}{SD(X) * SD(Y)}$	
Σ	Sigma	Summation	$\sum x =$ Sum of x scores	
σ	Sigma	Population standard Deviation	$\sigma = \sqrt{\frac{\sum (x-\mu)^2}{N}}$ $\sigma = \sqrt{E[(X-\mu)^2]}$ $= \sqrt{\sum (x-\mu)^2 P(x)}$	Measures of dispersion
σ^2	Sigma square	Population variance	$\sigma^2 = \frac{\sum (x-\mu)^2}{N}$	Measures of dispersion

Mathematical Statistical Symbols

Symbol	Text Equivalent	Meaning	Formula	Link to Glossary (if appropriate)
!	Factorial	Product of all integers up to the given number	$n! = n(n-1)(n-2)\dots 1$; $0! = 1$	
c	Complement	not	For example: A^c is not A	
∪	Union	or	For example: $(A \cup B)$ is happening of either event A or event B.	
∩	Intersection	And	For example: $(A \cap B)$ is happening of both event A and event B.	