

Stats without Tears

Relational Symbols			
=	equals is the same as	≠	is not equal to is different from
>	is greater than is more than exceeds is above	≥ or >=	is greater than or equal to is at least is not less than
<	is less than is fewer than is below	≤ or <=	is less than or equal to is at most does not exceed is not greater than is no more than
$A < x < B$		x is between A and B, exclusive	
$A \leq x \leq B$		x is between A and B, inclusive	
$A \approx B$		A is approximately equal to B	

sample statistic	population parameter	description
n	N	number of members of sample or population
\bar{x} "x-bar"	μ "mu" or μ_x	mean
M or Med or \tilde{x} "x-tilde"	(none)	median
s (TIs say S_x)	σ "sigma" or σ_x	standard deviation For variance, apply a squared symbol (s^2 or σ^2).
r	ρ "rho"	coefficient of linear correlation
\hat{p} "p-hat"	p	proportion
z t χ^2	(n/a)	calculated test statistic

Roman Letters

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- b = y intercept of a line.
- BD or BPD = binomial probability distribution.
- CI = confidence interval.
- CLT = Central Limit Theorem.
- d = difference between paired data.
- df or ν “nu” = degrees of freedom in a Student’s t or χ^2 distribution.
- DPD = discrete probability distribution.
- E = margin of error, a/k/a maximum error of the estimate.
- f = frequency.
- f/n = relative frequency.
- HT = hypothesis test.
- H_0 = null hypothesis.
- H_1 or H_a = alternative hypothesis.
- IQR = interquartile range, $Q_3 - Q_1$.
- m = slope of a line.
- M or Med = median of a sample.
- N = population size.
- ND = normal distribution, whose graph is a bell-shaped curve; also “normally distributed”.
- p = probability value. The specific meaning depends on context.
In geometric and binomial probability distributions, p is the probability of “success” on any one trial and $q = (1 - p)$ is the probability of “failure” (the only other possibility) on any one trial.
In hypothesis testing, p is the calculated p-value, the probability that rejecting the null hypothesis would be a wrong decision.
- $P(A)$ = the probability of event A .
- $P(AC)$ or $P(\text{not } A)$ = the probability that A does not happen.

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- $P(B | A)$ = the probability that event B will happen, given that event A definitely happens. It's usually read as the probability of B given A . Caution! The order of A and B may seem backward to you at first.
- P_{80} or $P80$ = 80th percentile (P_k or Pk = k -th percentile)
- q = probability of failure on any one trial in binomial or geometric distribution, equal to $(1 - p)$ where p is the probability of success on any one trial.
- Q_1 or $Q1$ = first quartile (Q_3 or $Q3$ = third quartile)
- r = linear correlation coefficient of a sample.
- R^2 = coefficient of determination.
- S = standard deviation of a sample.
- SD (or s.d.) = standard deviation.
- SEM = standard error of the mean (symbol is $\sigma_{\bar{x}}$)
- SEP = standard error of the proportion (symbol is $\sigma_{\hat{p}}$)
- X (capital X) = a variable.
- x (lower-case x) = one data value ("raw score"). As a column heading, x means a series of data values.
- \bar{x} "x-bar" = mean of a sample.
- \tilde{x} "x-tilde" = median of a sample.
- \hat{y} "y-hat" = predicted average y value for a given x , found by using the regression equation.
- Z = standard score or z-score.
- $z(\text{area})$ or $z\text{area}$ = the z-score, such that that much of the area under the normal curve lies to the right of that z . This is not a multiplication!

Greek Letters

- α "alpha" = significance level in hypothesis test, or acceptable probability of a Type I error (probability you can live with).

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- β “beta” = in a hypothesis test, the acceptable probability of a Type II error; $1-\beta$ is called the *power* of the test.
- μ mu, pronounced “mew” = mean of a population.
- ν nu: see *df*, above.
- ρ rho, pronounced “roe” = linear correlation coefficient of a population.
- σ “sigma” = standard deviation of a population.
- $\sigma_{\bar{x}}$ “sigma-sub-x-bar”; see SEM above.
- $\sigma_{\hat{p}}$ “sigma-sub-p-hat”; see SEP above.
- Σ “sigma” = summation. (This is upper-case sigma. Lower-case sigma, σ , means standard deviation of a population.)
- χ^2 “chi-squared” = distribution for multinomial experiments and contingency tables.