

Parameter	Statistic	Standard Error	Distribution	Assumptions
p	\hat{p}	$\sqrt{p_0(1-p_0)/n}$ (HT) $\sqrt{\hat{p}(1-\hat{p})/n}$ (CI)	Z Z	successes & failures ≥ 10 p_0 is the number in H_0
$p_1 - p_2$	$\hat{p}_1 - \hat{p}_2$ (2 independent samples)	$\sqrt{\hat{p}(1-\hat{p})(1/n_1 + 1/n_2)}$ (HT) $\sqrt{\frac{\hat{p}_1(1-\hat{p}_1)}{n_1} + \frac{\hat{p}_2(1-\hat{p}_2)}{n_2}}$ (CI)	Z Z	successes & failures ≥ 10 in each group
$\ln(RR) = \ln(p_1/p_2)$ take inverse $\ln(e)$ for CI	$\ln(\hat{p}_1/\hat{p}_2)$	$\sqrt{\frac{1}{a} - \frac{1}{a+c} + \frac{1}{b} - \frac{1}{b+d}}$	Z	large samples
$\ln(OR)$ take inverse $\ln(e)$ for CI	$\ln(\hat{OR})$	$\sqrt{\frac{1}{a} + \frac{1}{b} + \frac{1}{c} + \frac{1}{d}}$	Z	large samples
μ	\bar{x}	σ/\sqrt{n} (σ known) s/\sqrt{n} (σ unknown)	Z $t, df = n - 1$	$n \geq 30$ or normal
$\mu_1 - \mu_2$	$\bar{x}_1 - \bar{x}_2$ (2 independent samples)	$\sqrt{\frac{s_1^2}{n_1} + \frac{s_2^2}{n_2}}$	$t, df \approx \min\{n_1, n_2\} - 1$	$n_1, n_2 \geq 30$ or normal
μ_d	\bar{x}_d (matched pairs)	s_d/\sqrt{n} ($n = \#$ pairs)	$t, df = n - 1$	$n \geq 30$ or normal
X_{n+1}	\bar{x}	$\sqrt{s^2 + \frac{s^2}{n}}$	$t, df = n - 1$	normal

To find the p -value of a HT, look up the score $\frac{\text{statistic} - \text{hypothesized value}}{\text{SE}}$ on the specified distribution in the direction of H_A .

A $(100 - \alpha)\%$ CI is of the form $\text{statistic} \pm \text{multiplier} \times \text{SE}$. The multiplier is the $(100 - \alpha/2)\%$ point from the specified distribution.

Inference for two variables (explanatory variable not necessarily binary)

Two categorical variables (χ^2 test). χ^2 -statistic = $\sum_{i=1}^r \sum_{j=1}^c \frac{(\text{observed}_{ij} - \text{expected}_{ij})^2}{\text{expected}_{ij}}$, where $\text{expected}_{ij} = \frac{(\text{total of row } i) \times (\text{total of column } j)}{\text{grand total}}$.

Under the null hypothesis assumption, the statistic follows a χ^2 distribution with $(r-1)(c-1)$ degrees of freedom.

Categorical explanatory, quantitative response variables (ANOVA). F -statistic = $\frac{\text{MST}}{\text{MSE}}$, where $\text{MST} = \frac{n_1(\bar{x}_1 - \bar{x})^2 + \dots + n_I(\bar{x}_I - \bar{x})^2}{I-1}$ and $\text{MSE} = \frac{(n_1-1)s_1^2 + \dots + (n_I-1)s_I^2}{N-I}$. Under the null hypothesis assumption, the statistic follows an F distribution with $(I-1, N-I)$ degrees of freedom.

Two quantitative variables (Simple Linear Regression).

$$r = \frac{1}{n-1} \sum_{i=1}^n \frac{(x_i - \bar{x})(y_i - \bar{y})}{s_x s_y}, \quad b_1 = r \frac{s_y}{s_x}, \quad b_0 = \bar{y} - b_1 \bar{x}, \quad \hat{y} = b_0 + b_1 x, \quad SE(b_1) = \frac{s}{s_x} \frac{1}{\sqrt{n-2}}.$$

Under the null hypothesis $H_0 : \beta_1 = 0$, the standardized slope statistic $\frac{b_1 - 0}{SE(b_1)}$ follows a t distribution with $n-2$ degrees of freedom.