Stat 244
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Proportions

1 sample

$$TS: z = \frac{\hat{p} - p}{\sqrt{\left(\frac{p \cdot q}{n}\right)}} \qquad H_0: p = p_0$$

1-PropZTest

where $\hat{p} = \frac{x}{n}, q = 1 - p$

2 samples

$$TS: z = \frac{(\hat{p}_1 - \hat{p}_2)}{\sqrt{\left(\hat{p}(1-\hat{p})\left(\frac{1}{n_1} + \frac{1}{n_2}\right)\right)}}$$

2-PropZTest

$H_0: p_1 = p_2$

$$CI: (\hat{p}_1 - \hat{p}_2) \pm z_{\alpha/2} \sqrt{\left(\left(\frac{\hat{p}_1(1-\hat{p}_1)}{n_1}\right) + \left(\frac{\hat{p}_2(1-\hat{p}_2)}{n_2}\right)\right)}$$

$$\hat{p} = \frac{n_1\hat{p}_1 + n_2\hat{p}_2}{n_1 + n_2} = \frac{x_1 + x_2}{n_1 + n_2}$$

2-PropZInt

Means

1 sample

σ known

$H_0: \mu = \mu_0$

$$TS: z = \frac{\bar{x} - \mu_0}{\left(\sigma / \sqrt{n}\right)}$$

Z-test

σ unknown

$$TS: t = \frac{\bar{x} - \mu_0}{\left(s / \sqrt{n}\right)}, \; df = n - 1$$

t-test

$H_0: \mu = \mu_0$

2 samples

Dependent samples (paired)

$H_0: \mu_D = 0$

$$TS: t = \frac{\bar{d} - \mu_d}{\left(s_d / \sqrt{n}\right)}, \quad CI: \bar{d} \pm t_{\alpha/2}\left(\frac{s_d}{\sqrt{n}}\right), \; df = n - 1$$

t-test

Independent samples

σ's known

$H_0: \mu_1 = \mu_2$

$$TS: z = \frac{(\bar{x}_1 - \bar{x}_2) - (\mu_1 - \mu_2)}{\sqrt{\left(\frac{\sigma_1^2}{n_1}\right) + \left(\frac{\sigma_2^2}{n_2}\right)}} \qquad CI: (\bar{x}_1 - \bar{x}_2) \pm z_{\alpha/2}\sqrt{\left(\frac{\sigma_1^2}{n_1} + \frac{\sigma_2^2}{n_2}\right)}$$

2-SampZTest

2-SampZInt

σ's unknown

Pooled: No

$H_0: \mu_1 = \mu_2$ 2-SampTTest

$$TS: t = \frac{(\bar{x}_1 - \bar{x}_2) - (\mu_1 - \mu_2)}{\sqrt{\left(\frac{s_1^2}{n_1}\right) + \left(\frac{s_2^2}{n_2}\right)}}, df = \frac{\left(\frac{s_1^2}{n_1} + \frac{s_2^2}{n_2}\right)^2}{\left(\left(\frac{1}{n_1 - 1}\left(\frac{s_1^2}{n_1}\right)^2\right) + \left(\frac{1}{n_2 - 1}\left(\frac{s_2^2}{n_2}\right)^2\right)\right)}$$

$$CI: (\bar{x}_1 - \bar{x}_2) \pm t_{\alpha/2}\sqrt{\frac{s_1^2}{n_1} + \frac{s_2^2}{n_2}}$$

2-SampTInt

Variances or St. Dev

1 sample

$H_0: \sigma^2 = \sigma_0^2$

$$TS: \chi^2 = \frac{(n-1)s^2}{\sigma_0^2}$$

Program: SDINFER

2 samples

$H_0: \sigma_1^2 = \sigma_2^2$

$$TS: \; F = \frac{s_1^2}{s_2^2}, \text{Ndf} = n_1 - 1, \text{Ddf} = n_2 - 1$$

2-SampFTest