Proportions

1 sample

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

$H_0: p = p_0$

1-PropZTest

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

2 samples

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

$H_0: p_1 = p_2$

2-PropZTest

2-PropZInt

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

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

Means

1 sample

σ known

$H_0: \mu = \mu_0$ Z-test

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

σ unknown

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

$H_0: \mu = \mu_0$ t-test

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

$H_0: \mu_1 = \mu_2$

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

2-SampZTest 2-SampZInt

σ's unknown

Pooled: No

$H_0: \mu_1 = \mu_2$ 2-SampTTest, Pooled: No

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

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

2-SampTInt , Pooled: No

Pooled: Yes

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

2-SampTInt , Pooled: Yes

$H_0: \mu_1 = \mu_2$

$df = n_1 + n_2 - 2$

$$(\bar{x}_1 - \bar{x}_2) \pm t_{\alpha/2}\sqrt{\left(\left(\frac{(n_1 - 1)s_1^2 + (n_2 - 1)s_2^2}{(n_1 + n_2 - 2)}\right)\left(\frac{1}{n_1} + \frac{1}{n_2}\right)\right)}$$

2 Variances or St. Dev

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

$$TS: F = \frac{s_1^2}{s_2^2}$$

Ndf = n1 – 1 , Ddf = n2 – 1

2-SampFTest