Test on Means, Proportions and Variances

H_0	Test Statistic	H_a	Rejection Region
$\mu = \mu_0$	$Z = \dfrac{\bar{x} - \mu_0}{\sigma / \sqrt{n}}$; σ known	$\mu < \mu_0$ $\mu > \mu_0$ $\mu \neq \mu_0$	$Z < -z_\alpha$ $Z > z_\alpha$ $Z < -z_{\alpha/2}$ & $Z > z_{\alpha/2}$
$\mu = \mu_0$	$T = \dfrac{\bar{x} - \mu_0}{s / \sqrt{n}}$; $\upsilon = n - 1$, σ unknown	$\mu < \mu_0$ $\mu > \mu_0$ $\mu \neq \mu_0$	$T < -t_\alpha$ $T > t_\alpha$ $T < -t_{\alpha/2}$ & $T > t_{\alpha/2}$
$p = p_0$	$Z = \dfrac{\hat{p} - p_0}{\sqrt{p_0(1 - p_0)/n}}$; $\hat{p} = \dfrac{x}{n}$, $np_0 \geq 5$, $n(1 - p_0) \geq 5$	$p < p_0$ $p > p_0$ $p \neq p_0$	$Z < -z_\alpha$ $Z > z_\alpha$ $Z < -z_{\alpha/2}$ & $Z > z_{\alpha/2}$
$\sigma^2 = \sigma_0^2$	$\chi^2 = \dfrac{(n-1)s^2}{\sigma_0^2}$; $\upsilon = n - 1$	$\sigma^2 < \sigma_0^2$ $\sigma^2 > \sigma_0^2$ $\sigma^2 \neq \sigma_0^2$	$\chi^2 < \chi^2_{1-\alpha}$ $\chi^2 > \chi^2_\alpha$ $\chi^2 < \chi^2_{1-\alpha/2}$ & $\chi^2 > \chi^2_{\alpha/2}$
$\mu_1 - \mu_2 = d_0$	$Z = \dfrac{\bar{x}_1 - \bar{x}_2 - d_0}{\sqrt{\sigma_1^2 / n_1 + \sigma_2^2 / n_2}}$; σ_1 & σ_2 known	$\mu_1 - \mu_2 < d_0$ $\mu_1 - \mu_2 > d_0$ $\mu_1 - \mu_2 \neq d_0$	$Z < -z_\alpha$ $Z > z_\alpha$ $Z < -z_{\alpha/2}$ & $Z > z_{\alpha/2}$
$\mu_1 - \mu_2 = d_0$	$T = \dfrac{(\bar{x}_1 - \bar{x}_2) - d_0}{s_p \sqrt{1/n_1 + 1/n_2}}$; $\upsilon = n_1 + n_2 - 2$ $s_p^2 = \dfrac{(n_1 - 1)s_1^2 + (n_2 - 1)s_2^2}{n_1 + n_2 - 2}$, $\sigma_1 = \sigma_2$ unknown	$\mu_1 - \mu_2 < d_0$ $\mu_1 - \mu_2 > d_0$ $\mu_1 - \mu_2 \neq d_0$	$T < -t_\alpha$ $T > t_\alpha$ $T < -t_{\alpha/2}$ & $T > t_{\alpha/2}$
$\mu_1 - \mu_2 = d_0$	$T = \dfrac{\bar{x}_1 - \bar{x}_2 - d_0}{\sqrt{s_1^2 / n_1 + s_2^2 / n_2}}$; $\sigma_1 \neq \sigma_2$ & *unknown*, $\upsilon = \dfrac{(s_1^2 / n_1 + s_2^2 / n_2)^2}{(s_1^2 / n_1)^2 / (n_1 - 1) + (s_2^2 / n_2)^2 / (n_2 - 1)}$	$\mu_1 - \mu_2 < d_0$ $\mu_1 - \mu_2 > d_0$ $\mu_1 - \mu_2 \neq d_0$	$T < -t_\alpha$ $T > t_\alpha$ $T < -t_{\alpha/2}$ & $T > t_{\alpha/2}$
$\mu_d = d_0$	$T = \dfrac{\bar{D} - d_0}{s_d / \sqrt{n}}$; $\upsilon = n - 1$, paired observations	$\mu_d < d_0$ $\mu_d > d_0$ $\mu_d \neq d_0$	$T < -t_\alpha$ $T > t_\alpha$ $T < -t_{\alpha/2}$ & $T > t_{\alpha/2}$
$p_1 - p_2 = 0$	$Z = \dfrac{\hat{p}_1 - \hat{p}_2}{\sqrt{\hat{p}\left(1 - \hat{p}\right)(1/n_1 + 1/n_2)}}$; $\hat{p} = \dfrac{x_1 + x_2}{n_1 + n_2}$	$p_1 - p_2 < 0$ $p_1 - p_2 > 0$ $p_1 - p_2 \neq 0$	$Z < -z_\alpha$ $Z > z_\alpha$ $Z < -z_{\alpha/2}$ & $Z > z_{\alpha/2}$
$\sigma_1^2 = \sigma_2^2$	$F = \dfrac{s_1^2}{s_2^2}$; $\upsilon_1 = n_1 - 1$, and $\upsilon_2 = n_2 - 1$	$\sigma^2 < \sigma_0^2$ $\sigma^2 > \sigma_0^2$ $\sigma^2 \neq \sigma_0^2$	$F < f_{1-\alpha}(\upsilon_1, \upsilon_2)$ $F > f_\alpha(\upsilon_1, \upsilon_2)$ $F < f_{1-\alpha/2}(\upsilon_1, \upsilon_2)$& $F > f_{\alpha/2}(\upsilon_1, \upsilon_2)$