## 9.3 Summary and examples

**Summary of hypothesis tests of two independent samples**

| **Population** | **Sample** | $\sigma^2$ | **Equal** $\sigma^2$ | **Test statistic** | **CI** |
|---|---|---|---|---|---|
| - | Large | Known | - | $\frac{(\bar{X}_1-\bar{X}_2)-c}{\sqrt{\frac{\sigma_1^2}{n_1}+\frac{\sigma_2^2}{n_2}}} \sim N(0,1)$ | $\left[(\bar{x}_1-\bar{x}_2) \pm Z_{\alpha/2}\sqrt{\frac{\sigma_1^2}{n_1}+\frac{\sigma_2^2}{n_2}}\right]$ |
| Normal | - | | | | |
| - | Large | Unknown | - | $\frac{(\bar{X}_1-\bar{X}_2)-c}{\sqrt{\frac{s_1^2}{n_1}+\frac{s_2^2}{n_2}}} \sim N(0,1)$ | $\left[(\bar{x}_1-\bar{x}_2) \pm Z_{\alpha/2}\sqrt{\frac{s_1^2}{n_1}+\frac{s_2^2}{n_2}}\right]$ |
| Normal | Small | Unknown | Equal | $s_p = \sqrt{\frac{(n_1-1)s_1^2+(n_2-1)s_2^2}{n_1+n_2-2}}$<br>$\frac{(\bar{X}_1-\bar{X}_2)-c}{s_p\sqrt{\frac{1}{n_1}+\frac{1}{n_2}}} \sim t(n_1+n_2-2)$ | $\left[(\bar{x}_1-\bar{x}_2) \pm t_{\alpha/2}^{(n_1+n_2-2)} s_p\sqrt{\frac{1}{n_1}+\frac{1}{n_2}}\right]$ |
| | | | Not Equal | $v = \left\lfloor \frac{(s_1^2/n_1+s_2^2/n_2)^2}{\frac{(s_1^2/n_1)^2}{n_1-1}+\frac{(s_2^2/n_2)^2}{n_2-1}} \right\rfloor$<br>$\frac{(\bar{X}_1-\bar{X}_2)-c}{\sqrt{\frac{s_1^2}{n_1}+\frac{s_2^2}{n_2}}} \sim t(v)$ | $\left[(\bar{x}_1-\bar{x}_2) \pm t_{\alpha/2}^{(v)}\sqrt{\frac{s_1^2}{n_1}+\frac{s_2^2}{n_2}}\right]$ |