

Population distribution	Parameter of the distribution	Test statistic	Distribution of the statistic under $\mathcal{H}_0$
Normal distribution OR Any statistical distribution if $N_1$ and $N_2 \geq 30$	$\sigma_1^2$ and $\sigma_2^2$ are known	$z = \frac{\bar{X}_1 - \bar{X}_2}{\sqrt{\frac{\sigma_1^2}{N_1} + \frac{\sigma_2^2}{N_2}}}$	$z \sim \mathcal{N}(0, 1)$  Z-test
Normal distribution AND $N_1$ and $N_2 \geq 30$	$\sigma_1^2$ and $\sigma_2^2$ are unknown	$T = \frac{\bar{X}_1 - \bar{X}_2}{\sqrt{\frac{S_1^2}{N_1} + \frac{S_2^2}{N_2}}}$	$T \sim \mathcal{T}_{N_1+N_2-2} \text{ df}$  Student T-test
Normal distribution AND $N_1$ or $N_2 \leq 30$	$\sigma_1^2 = \sigma_2^2$ are unknown	$T = \frac{\bar{X}_1 - \bar{X}_2}{\sqrt{S^2 \left( \frac{1}{N_1} + \frac{1}{N_2} \right)}}$  $S^2 = \frac{(N_1 - 1)S_1^2 + (N_2 - 1)S_2^2}{N_1 + N_2 - 2}$	$T \sim \mathcal{T}_{N_1+N_2-2} \text{ df}$  Student T-test
Normal distribution AND $N_1$ or $N_2 \leq 30$	$\sigma_1^2 \neq \sigma_2^2$ are unknown	$T = \frac{\bar{X}_1 - \bar{X}_2}{\sqrt{\frac{S_1^2}{N_1} + \frac{S_2^2}{N_2}}}$	$T \sim \mathcal{T}_\nu \text{ df}$  Welch-Aspin T-test