σ_1 and σ_2 unknown and ***un***equal

σ_1 and σ_2 unknown and unequal

- **Independent Samples**
- **Unknown σ_1 and σ_2 but assumed to be unequal**
- **At LEAST ONE of the following is true**
  - **Both samples are "large"**
  - **If either sample is small, both populations are normally distributed.**

Degrees of Freedom given by

$$df = \frac{\left(\frac{s_1^2}{n_1} + \frac{s_2^2}{n_2}\right)^2}{\frac{\left(\frac{s_1^2}{n_1}\right)^2}{n_1 - 1} + \frac{\left(\frac{s_2^2}{n_2}\right)^2}{n_2 - 1}}$$

FORMULAS YOU WILL USE

$$s_{\bar{x}_1 - \bar{x}_2} = \sqrt{\frac{s_1^2}{n_1} + \frac{s_2^2}{n_2}}$$ **estimator of the standard deviation of $\bar{x}_1 - \bar{x}_2$**

$$\left(\bar{x}_1 - \bar{x}_2\right) \pm t s_{\bar{x}_1 - \bar{x}_2}$$ **For Confidence Intervals**

$$t_O = \frac{\left(\bar{x}_1 - \bar{x}_2\right) - \left(\mu_1 - \mu_2\right)}{s_{\bar{x}_1 - \bar{x}_2}}$$ **The test statistic**

p. 456, #34

Assuming that the two populations are normally distributed with unequal and unknown population standard deviation, construct a 99% confidence interval for $\mu_1 - \mu_2$ for the following

$n_1 = 39$ $\bar{x}_1 = 52.61$ $s_1 = 3.55$

$n_2 = 36$ $\bar{x}_2 = 43.75$ $s_2 = 5.40$ df = 59

p. 456, #36

Assuming that the two populations are normally distributed with unequal and unknown population standard deviation, Test at the 1% significance level if the two population means are different.

$n_1 = 39$ $\bar{x}_1 = 52.61$ $s_1 = 3.55$

$n_2 = 36$ $\bar{x}_2 = 43.75$ $s_2 = 5.40$ df = 59