Two Population Means

σ_1 and σ_2 Known

Confidence Interval:

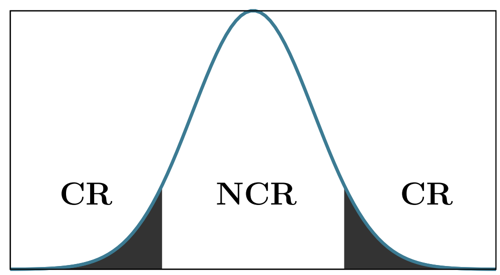
- **Using Formula:** $(\bar{x}_1 - \bar{x}_2) - E < \mu_1 - \mu_2 < (\bar{x}_1 - \bar{x}_2) + E$
- **Margin of Error:** $E = Z_{\alpha/2} \bullet \sqrt{\frac{\sigma_1^2}{n_1} + \frac{\sigma_2^2}{n_2}}$
- **Final Answer:** **Lower Value** $< \mu_1 - \mu_2 <$ **Upper Value**
- **Margin of Error:** $E = \frac{\textbf{C.I. Upper Value} - \textbf{C.I. Lower Value}}{2}$
- **Finding Confidence Interval Using TI: STAT > TESTS > 2-SampZInt > ENTER**

Hypothesis Testing:

Two–Tail Test:

$H_0 : \mu_1 = \mu_2$

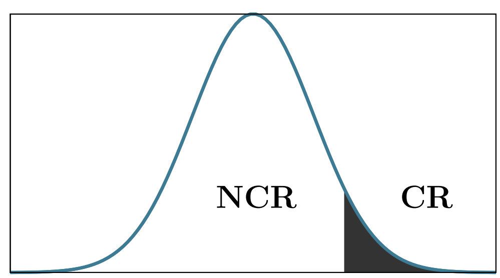
$H_1 : \mu_1 \neq \mu_2$



Right–Tail Test:

$H_0 : \mu_1 \leq \mu_2$

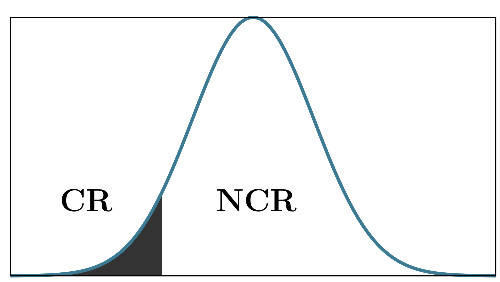
$H_1 : \mu_1 > \mu_2$



Left–Tail Test:

$H_0 : \mu_1 \geq \mu_2$

$H_1 : \mu_1 < \mu_2$



Critical Value(s):

- **Using TI Calculator** **PRGM > ZVAL > ENTER (Twice)**

Computed Test Statistic & P–Value:

- **Using TI Calculator** **STAT > TESTS > 2-SampZTest**
- **Using formula for C.T.S.:** $$z = \frac{(\bar{x}_1 - \bar{x}_2) - (\mu_1 - \mu_2)}{\sqrt{\dfrac{\sigma_1^2}{n_1} + \dfrac{\sigma_2^2}{n_2}}}$$
- **Using normalcdf(for P–Value:** **2ND > VARS > normalcdf(> ENTER**

Example:

Consider the chart below:

Sample 1	**Sample 2**
$n_1 = 50$	$n_2 = 40$
$\bar{x}_1 = 84$	$\bar{x}_2 = 80$
$s_1 =$ Not Given	$s_2 =$ Not Given
$\sigma_1 = 6.5$	$\sigma_2 = 7.8$

- Find 99% confidence interval for the difference of two population means.

  Solution:
  Using 2-SampZInt, we get $\boxed{0.04 < \mu_1 - \mu_2 < 7.96}$

- Find the margin of error.

  Solution:

  Using the upper and lower values from confidence interval, we get $\boxed{E = \frac{7.96 - 0.04}{2} = 3.96}$

- Test the claim that $\mu_1 > \mu_2$.

  Solution:
  Here we have $\boxed{H_0 : \mu_1 \leq \mu_2, \qquad H_1 : \mu_1 > \mu_2 \text{ RTT, Claim}}$

  With no α, using ZVAL, we get C.V. $\boxed{Z = 1.645}$

  Using 2-SampZTest, we get $\boxed{\text{C.T.S. } Z = 2.600, \text{ P-Value } p = .005}$

  Final Conclusion: $\boxed{\text{Support the Claim}}$