Difference of Two Independent Population Means

	SC	OC
Average life of Diehard(μ_1) batteries is longer that Everlast(μ_2)	$\mu_1 > \mu_2$	$\mu_1 \leq \mu_2$

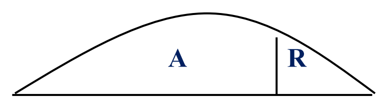
Example 1 : Test at the $\alpha = 1\%$ whether the **average life of Diehard batteries is longer than Everlast**. Sample from these two type of batteries are as such: Below is a sample information of these two brands.

Die Hard	(μ_1)	$n_1 = 44$	$\bar{x}_1 = 51.8$	$s_1 = 8.5$
Everlast	(μ_2)	$n_2 = 36$	$\bar{x}_2 = 47.4$	$s_2 = 10.7$

SC: $\mu_1 > \mu_2$ **H₀** : $\mu_1 \leq \mu_2$ **H₀** : $\mu_1 - \mu_2 \leq 0$ **Hint**: Use **H₁** to determine if it is LTT ,TTT or RTT test

OC: $\mu_1 \leq \mu_2$ **H₁** : $\mu_1 > \mu_2$ **H₁** : $\mu_1 - \mu_2 > 0$ **Note:** $\mu_1 - \mu_2$ **in H₁ is more than,** then it is a **RTT**

When **α = .01** , n > 30 and one –tailed test then by using bottom row of page **Table 2**



Critical value = CV=**Z = 2.326**

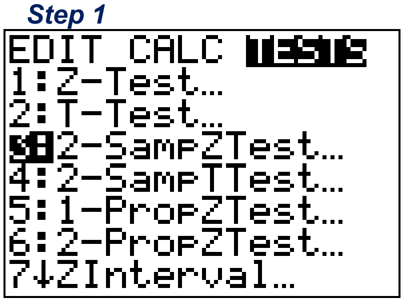
CPoint Estimate $(\bar{x}_1 - \bar{x}_2) = (51.8 - 47.4) = 4.4$

$$z = \frac{(\bar{x}_1 - \bar{x}_2) - 0}{\sqrt{\frac{s_1^2}{n_1} + \frac{s_2^2}{n_2}}} = \frac{(51.8 - 47.4) - 0}{\sqrt{\frac{8.5^2}{44} + \frac{10.7^2}{36}}} = \frac{4.4}{\sqrt{1.6420 + 3.1802}} = \frac{4.4}{2.1960} = 2.003$$

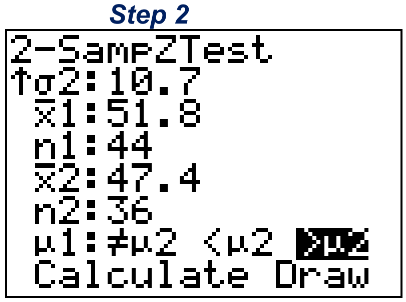
Falls Outside CR

TI-83/84 *stat* ⟶ *test* ⟶ *Option 3*

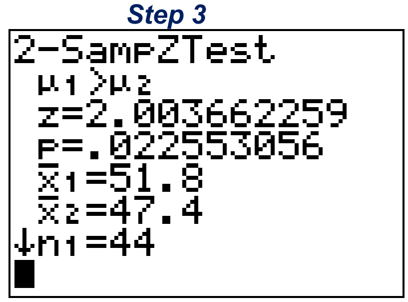
Step 1



Step 2



Step 3



Conclusion: Accept or reject **H₀**? ***Outside*** CR then **Fail to Reject H₀** or **Accept H₀**

Comment: Accept or reject **SC**? Reject that the average life of Diehard batteries is longer than Everlast brand.
P-value: 0 .02256 more than **α = 0.01** accept **Ho**

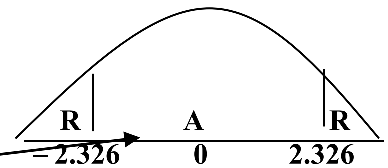
Example 2 : A researcher wants to test if the mean GPA of all male and female college students who participate in sports are different. She took a random sample of 33 male students and 38 female students who are involved in sports. She found out the mean GPAs of the two groups to be 2.62 and 2.74, respectively, with the corresponding standard deviations equal to .43 and .38. At 2% significance level, test whether the **mean** GPAs of the **two populations are different.**

SC: $\mu_m \neq \mu_f$ $\quad H_0 : \mu_m = \mu_f$ $\quad H_0 : \mu_m - \mu_f = 0$ **Hint**: Use **H1** to determine if it is LTT ,TTT or RTT test

OC: $\mu_m = \mu_f$ $\quad H_1 : \mu_m \neq \mu_f$ $\quad H_1 : \mu_m - \mu_f \neq 0$ **Note:** $\mu_m - \mu_f$ **in H1 is not equal** then it is a **TTT**

When **α = .02** , n > 30 and two –tailed test then by using bottom row of page **Table 2**

Critical value = CV=**Z** = ± **2.326**

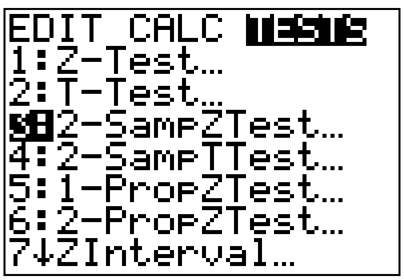


$$z = \frac{(2.62 - 2.74) - 0}{\sqrt{\frac{.43^2}{33} + \frac{.38^2}{38}}} = \frac{-.12}{\sqrt{.0094}} = -1.24$$

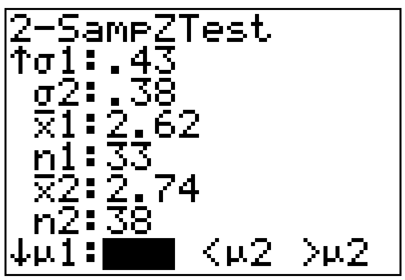
Falls Outside CR

TI-83/84 *stat* ⟶ *test* ⟶ *Option 3*

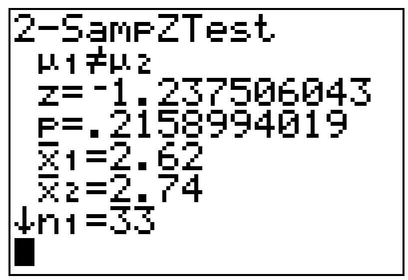
Step 1



Step 2



Step 3



Conclusion: Accept or reject **H0**? ***Outside*** CR then **Fail to Reject H0** or **Accept H0**

Comment: Accept or reject **SC**? Reject that the **mean** GPAs of the two populations **are different**.
P-value: 0 .2159 more than **α = 0.02** accept **Ho**