Practice Quiz 15 (Problems on quiz 15 is based on sections 12, 13, and 14)

Example 1 : Test at the $\alpha = 5\%$ whether the **average life of Diehard batteries is less or equal 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)	$n_1 = 60$	$\bar{x}_1 = \mathbf{48}$	$s_1 = 8$
Everlast	(μ_2)	$n_2 = 40$	$\bar{x}_2 = \mathbf{46}$	$s_2 = 10$

SC: $\mu_1 \leq \mu_2$ **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: $\mu_1 > \mu_2$ **H₁ :** $\mu_1 > \mu_2$ **H₁ :** $\mu_1 - \mu_2 > 0$ It is a right tailed test.

When α = **.05** , n > 30 and one –tailed test then by using bottom row of page **Table 2**

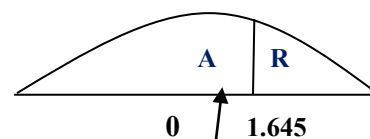**Critical value =** CV=**Z** = **1.645**

CPoint Estimate $(\bar{x}_1 - \bar{x}_2) = (48 - 46) = 2$

$$\textbf{Test statistics} = z = \frac{(\bar{x}_1 - \bar{x}_2) - 0}{\sqrt{\dfrac{s_1^2}{n_1} + \dfrac{s_2^2}{n_2}}} = \quad = \frac{48 - 46}{\sqrt{\dfrac{8^2}{60} + \dfrac{10^2}{40}}} = 1.06$$

Conclusion: Accept or reject **H₀**? Accept or fail to reject **H₀** because the TS falls in acceptable region.
Comment: Accept or reject **SC**? Accept **SC** because **H₀** and **SC** have the same format.

P-value: 0.145 is larger than α = **0.05**   Accept or fail to reject **Ho**

Example 2 : Research question: Do patients who receive our treatment weigh less than participants who do not receive our treatment? Participants were randomly assigned to the treatment condition or a control group. After our intervention, their weights were measured in pounds. Weight is a quantitative variable, so we are going to be comparing means in this example. Our treatment group has a sample size of 45, mean of 140 pounds, and standard deviation of 20 pounds. Our control group has a sample size of 40, sample mean of 150 pounds, and standard deviation of 25 pounds. Use α = **0.10**

Group 1 is those who receive our treatment and **Group 2** is those who do not receive our treatment
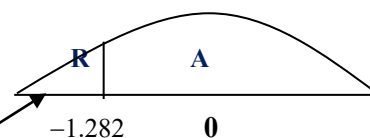
SC: $\mu_1 < \mu_2$ **H₀ :** $\mu_1 \geq \mu_2$ **H₀ :** $\mu_1 - \mu_2 \geq 0$ **Hint**: Use **H₁** to determine if it is LTT ,TTT or RTT test

OC: $\mu_1 \geq \mu_2$ **H₁ :** $\mu_1 < \mu_2$ **H₁ :** $\mu_1 - \mu_2 < 0$ It is a LTT because in **H₁** we have < 0

When α = **10** , n > 30 and one –tailed test then by using bottom row of page **Table 2**

Critical value = CV=**Z** = **−1.282**

CPoint Estimate $(\bar{x}_1 - \bar{x}_2) = (140 - 150) = -10$

$$z = \frac{(\bar{x}_1 - \bar{x}_2) - 0}{\sqrt{\dfrac{s_1^2}{n_1} + \dfrac{s_2^2}{n_2}}} = \frac{140 - 150}{\sqrt{\dfrac{20^2}{45} + \dfrac{25^2}{40}}} = \frac{-10}{\sqrt{\dfrac{400}{45} + \dfrac{625}{40}}} = -2.02$$

Conclusion: Accept or reject **H₀**? Reject **H₀**   **Comment**: Accept **SC** because **H₀** and **SC** are different.
P-value: 0.022 that is less than α = **0.10,** therefore we reject **Ho**