Assignment 10.1

① Sample size $n = 8$

Sample mean $\bar{x} = (60 + 62 + 67 + 69 + 70 + 72 + 75 + 78)/8 = 69.125$

claim is $\mu_0 \neq \bar{x}$

$\alpha = 0.05 \therefore t_\alpha = \pm 2.37$ with degree freedom $= n-1 = 7$

Sample standard deviation $S = \sqrt{\frac{\sum_{i=1}^{8}(x_i - \bar{x})^2}{(n-1)}} = 6.104$

$= \sqrt{~~(60-69.125)^2 + (62-69.125)^2 + (67-69.125)^2~~}$

Test statistic

$\therefore t = \frac{(\bar{x} - \mu_0)}{S/\sqrt{n-1}} = \frac{(69.125 - 65)}{6.104/\sqrt{7}} = \frac{4.125 \cdot \sqrt{7}}{6.104} = 1.78$

Here Null Hypothesis H_0: ~~$\mu_0 = \bar{x}$~~ $\mu_0 \neq \bar{x}$

Alternate Hypothesis H_1: ~~$\mu_0 \neq \bar{x}$~~ $\mu_0 = \bar{x}$

since t within $t_\alpha = \pm 2.37$ we accept H_0

~~② Sample size $n_1 = n_2 = 5$ level of significance $\alpha = 0.05$~~

~~degree of freedom = $\therefore t_\alpha = t_{(4, 0.05)}$~~

② Sample size n_1 & $n_2 = 5$

degree of freedom $= n_1 + n_2 - 2 = 8$

$LOS = \alpha = 0.05 \therefore t_{(8, 0.05)} = 2.31$

$\therefore \bar{x}_1 = 93.4 \quad \bar{x}_2 = 91$

$S_1 = 31.8 \quad S_2 = 113.75$

$\therefore t = \frac{\bar{x}_1 - \bar{x}_2}{\sqrt{\frac{n_1 S_1^2 + n_2 S_2^2}{n_1 + n_2 - 2}\left(\frac{1}{n_1} + \frac{1}{n_2}\right)}} = \frac{93.4 - 91}{\sqrt{\frac{93.4 \cdot (31.8)^2 + 91 (113.75)^2}{8} \cdot \left(\frac{10}{25}\right)}}$

$= 0.009517$

Here $H_0 = \bar{x}_2 \geq \bar{x}_1$ $\quad \therefore$ as $t_{(8, 0.005)} > t$

$H_1 = \bar{x}_2 < \bar{x}_1$ $\quad$ we reject H_0 & accept H_1