T-test Assignment

1) H_0: Aerobic program has no effect on heart rate.

H_1: Aerobic program lowers heart rate hence effective

$\mu = 72$, $\bar{X} = 69$, $n = 25$, Sd = 6.5 (sample)

$$t_{n-1} = \frac{\bar{X} - \mu}{Sd/\sqrt{n}}$$

$$= \frac{69 - 72}{6.5/\sqrt{25}} = \frac{-3}{1.3} = -2.308$$

At 95% confidence interval, $t_{24} = 2.064$ @2.5

∴ Reject the null hypothesis as $2.064 < 2.30$ (ignoring negative value).

∴ Aerobic program does lower heart rate

2) $\mu = 15$, $\bar{X} = 17$, Sd = 5.5, $n = 30$

$$t_{29} = \frac{\bar{X} - \mu}{sd/\sqrt{n}} = \frac{17 - 15}{5.5/\sqrt{30}}$$

$$= 1.99 \approx 2$$

At 2.5% CI, $t_{29} = 2.045$

As $2 < 2.045$, we accept the null hypothesis, i.e, Designer's claim of a better shoe is not supported by trial results

$\mu = 16$, $\bar{X} = 18$, $s = 2.05$, $n = 10$

9)

$H_0: \mu = 16$

$H_1: \mu \neq 16$

$$t_q = \frac{18 - 16}{2.05/\sqrt{10}}$$

$$= 3.085$$

At 2.5% C.I, $t_q = 2.262$

As $3.085 > 2.262$, we reject H_0 and conclude that mean no. of complaints is not equal to 16

38) $\bar{X}_1 = 30$, $S = 6.63$, $n = 15$

$\bar{X}_2 = 26$, $S = 6.20$, $n = 15$

$H_0: \mu_1 = \mu_2 = 0$

$H_1: \mu_1 \neq \mu_2$

$$t_{n_1+n_2-2} = \frac{\bar{X}_1 - \bar{X}_2 - \delta}{S_p\sqrt{\frac{1}{n_1} + \frac{1}{n_2}}}$$

where $S_p^2 = \frac{(n_1 - 1)S_1^2 + (n_2 - 1)S_2^2}{n_1 + n_2 - 2}$

$$t_{28} = \frac{(30 - 26) - 0}{S_p\sqrt{\frac{1}{15} + \frac{1}{15}}}$$

$$= \frac{4}{s_p \times 0.3654}$$

where

$$s_p^2 = \frac{(15-1)6.63^2 + (15-1)6.20^2}{15+15-2}$$

$$= 41.198$$

$$t = \frac{4}{\sqrt{41.198 \times 0.3654}}$$

$$= 1.707$$

Critical value at 28 dof = 2.048.

∴ we accept the null hypothesis, ie, the diff is not very significant.

4) D = control − relax

D: 3 8 5 2 5 0 3 3 6 4 6 4 1 9 1

$$\bar{D} = \frac{60}{15} = 4$$

$$SD \text{ of } D = \sqrt{\frac{1}{14}\left[\Sigma d_i^2 - n\bar{d}^2\right]}$$

$$= \sqrt{\frac{1}{14}\left[332 - 15 \times 16\right]}$$

$$= \sqrt{6.57} = 2.56$$

$$t_{14} = \frac{\bar{d} - (\mu_1 - \mu_2)}{SD_D / \sqrt{n}}$$

$$= \frac{4.[illegible] - 0}{2.56/\sqrt{15}} = 6.05$$

Critical value of t @ 2.5% = 2.145

As t value > critical value we reject null hypothesis. Thus, we conclude it is a significant outcome. Relaxation group is different from control group.