T-Test Assignment:-

$S < 30$ & pop. stddev is unknown

1. $t = \frac{x - \mu}{s/\sqrt{n}}$

s = sample std dev

μ = pop. Mean

n = Sample Size

x = Sample Mean.

1) $\mu = 72$ beats/Min

$n = 25$

$s = 6.5$

$x = 69$ beats/Min (mean group heart rate)

$\alpha = 0.05$

$$t = \frac{x - \mu}{s/\sqrt{n}} = \frac{69 - 72}{\frac{6.5}{\sqrt{25}}} = \frac{-3}{6.5/5} = \frac{-3}{1.3}$$

$t = -2.3077$

i) $H_0 \Rightarrow \mu = 72$

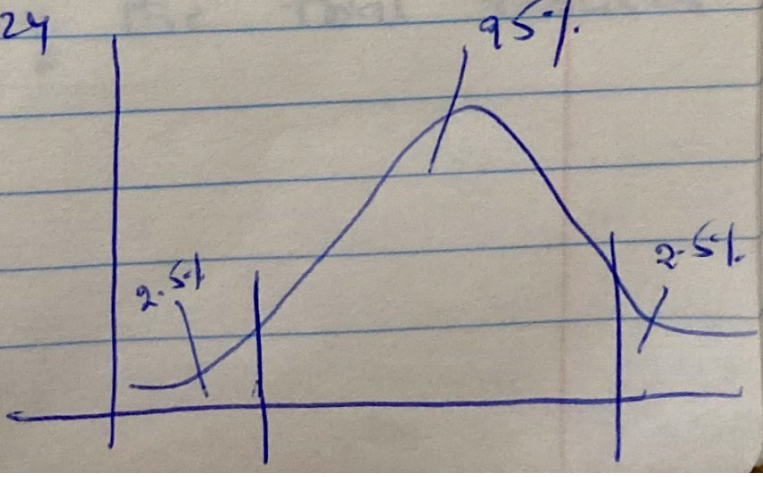
$H_a \Rightarrow \mu \neq 72$

ii) $\alpha = 0.05$ C.I = 95%.

iii) dof $= n - 1 = 25 - 1 = 24$

iv) two tailed test

~~$t_{crit} = 2.06$~~



$t_{crit} = 2.064$

$t_{sample} = -2.3077$

if t_s is greater than 2.064 (or) less than -2.064 then t_{sample} falls under tail region & H_0 is rejected which means accept the H_a

Here -2.3077 falls under the tail region & Hence H_0 is rejected & H_a is accepted.

So there is significant effect with the aerobic program on individuals heart rate at ~~$p = 0.05$~~ $\alpha = 0.05$

2) μ = pop mean = 15 months

$n = 30$

$\bar{x} = 17$ months

$s = 5.5$ months

i) $H_0 \rightarrow \mu = 15$ months

$H_a \rightarrow \mu \neq 15$ months

ii) $\alpha = 0.05$

iii) two tailed t-test

$$t_{sample} = \frac{\bar{x} - \mu}{s/\sqrt{n}} = \frac{17 - 15}{5.5/\sqrt{30}} = \frac{2}{1.0041} = 1.9918$$

t_{crit} at 0.05 & 29 dof = 2.045

falling inside the main region ($1.9918 < 2.045$)

∴ Accept null Hypothesis.

designers claim of better shoe is not supported by the trial results.

3) $\bar{x} = 30$ $\bar{X} = 26$

$s = 6.63$ $s = 6.20$

$n = 15$ $n = 16$

i) $H_0 \rightarrow$ Relaxation training doesn't have significant effect on reducing levels of anxiety

$H_a \rightarrow$ Relaxation training has significant effect on reducing levels of anxiety

ii) $\alpha = 0.05$

iii) dof $= 14 + 15 = 29$

iv) two tailed test

$t_{critical} = 2.045$

$t_{sample} = ??$

$$= \frac{30 - 26}{}$$

$$= \frac{(\bar{x}_1 - \bar{x}_2) + (\mu_1 - \mu_2)}{\sqrt{\frac{s_p^2}{n_1} + \frac{s_p^2}{n_2}}}$$

Since there is pop. means here $\mu_1 = \mu_2 = 0$

$$\therefore \frac{\bar{X}_1 - \bar{X}_2}{\sqrt{\frac{S_p^2}{n_1} + \frac{S_p^2}{n_2}}}$$

$$S_p^2 = \frac{SS_1 + SS_2}{df_1 + df_2}$$

SS_1 = Sum of Squares

S_1^2 = Variance

$df_1 = 15 - 1 = 14$

$df_2 = 16 - 1 = 15$

$SS_1 = S_1^2(df_1) = 6.63^2 * 14 = 615.3966$

$SS_2 = S_2^2(df_2) = (6.20)^2 * 16 = 615.04$

$$= \frac{1230.4366}{29}$$

$$= 42.4288$$

$$\therefore = \frac{30 - 26}{\sqrt{\frac{42.4288}{15} + \frac{42.4888}{16}}} = \frac{4}{\sqrt{2.83 + 2.65}}$$

$$= \frac{4}{2.3409} = 1.708T$$

$t_{sample} < 2.045$ accept the null Hypothesis

∴ relaxation training doesn't have significant impact on reducing levels of anxiety

4) H_0 → Control = Relaxation (stress levels)
H_A → Control ≠ Relaxation

$\alpha = 0.05$

$df = 15 - 1 = 14$

$t_{critical} = 2.145$

$t_{sample} = \frac{\bar{X}_D}{S_D/\sqrt{n}}$ $\bar{X}_D$ = Mean difference

S_D = Std. dev difference

Contr	Relax	diff
38	35	3
40	32	8
35	30	5
36	34	2
35	30	5
32	32	0
31	28	3
30	27	3
28	22	6
26	22	4
24	18	6
21	17	4
18	17	1
34	25	9
22	21	1

$$\bar{x}_D = \frac{60}{15} = 4$$

SD = std. dev =

$$\frac{(-1)^2 + 4^2 + 1 + 4 + 1 + 16 + 1 + 1 + 4 + 0 + 4 + 0 + 9 + 25 + 9}{14}$$

$$= 92/14 = 6.5714$$

$$= \frac{4}{\left(\frac{6.5714}{\sqrt{15}}\right)} = 4/1.6967 = 2.3574$$

fall under the tail region & hence reject Null hypothesis

therefore the relaxation training has significant effect.

5) $\mu = 16$ complaints

$\bar{x} = 18$ complaints

$n = 10$ months

$s = 2.05$

$H_0 \rightarrow \mu = 16$

$H_a \rightarrow \mu \neq 16$

$\alpha = 0.05$

two tailed t-test

$$t_{sample} = \frac{\bar{x} - \mu}{s/\sqrt{n}} = \frac{18 - 16}{2.05/\sqrt{10}} = \frac{2}{0.6482}$$

$$= 3.0854$$

$t_{crit} \Rightarrow \alpha = 0.05, dof = 9 \Rightarrow 2.262$

$3.0854 > 2.262$

under the tail region reject H_0

$\mu \neq 16$ so, bigboss will replace the manager.