T-test Assignment

(1) Given, $\mu_p = 72$, $n = 25$, $\bar{X} = 69$, $\sigma = 6.5$

$$t = \frac{\bar{X} - \mu}{SE} = \frac{69 - 72}{\frac{6.5}{\sqrt{25}}} = \frac{-3(5)}{6.5} = -2.307$$

Here, Null → heart beat didn't change

Alternative → heart beat changed

$t_{critical} = -1.07$ (taking α as 5%.)

Since $t < t_{critical}$, we reject null with 95% confidence.

(2) Given, $\mu_p = 15$, $n = 30$, $\bar{X} = 17$, $\sigma = 5.5$, $\alpha = 0.05$

Null → $\mu = 15$ Alternative → $\mu \neq 15$

$$t = \frac{\bar{X} - \mu}{SE} = \frac{17 - 15}{\frac{5.5}{\sqrt{30}}} = 1.99$$

$t_{critical} = 2.12$

As t-value falls in the curve region, we accept null, with 95% confidence

(3) Given, $\mu_p = 100$

Control: $\bar{X}_1 = 30$, $S_1 = 6.63$, $n_1 = 15$ Relaxation: $\bar{X}_2 = 26$, $S_2 = 6.20$, $n_2 = 15$

$$t = \frac{\bar{x}_1 - \bar{x}_2}{\sqrt{\frac{S_1^2}{n_1} + \frac{S_2^2}{n_2}}} = \frac{30 - 26}{\sqrt{2.93 + 2.74}} = 1.71$$

$t_{critical} = 2.048$ (with α as 5%.)

Since $t < t_{critical}$, the outcome is not statistically significant.

④ This problem is related to previous problem.

Given,

pairs:	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
control:	38	40	35	36	35	32	31	30	28	26	24	21	18	32	2
Relax:	35	32	30	34	30	32	28	27	22	22	18	17	17	25	2

let D be the difference's b/w control & relax.

then $\Sigma D = 60$, mean of $D = 4$, $\Sigma D^2 = 332$, σ of $D = 2.58$

to find t, we have, $t = \dfrac{\Sigma D / N}{\sqrt{\dfrac{\Sigma D^2 - (\Sigma D)^2/N}{N(N-1)}}}$

$$t = \frac{60/15}{\sqrt{\dfrac{332 - (60)^2/15}{15(14)}}} = \frac{4}{\sqrt{\dfrac{332-240}{210}}} = \frac{4}{0.66} = 6.06$$

$t_{critical} = 2.145$

As $t_{value} > t_{critical}$, relaxation is significantly different than control group. Outcome is statistically significant.

⑤ Given, $\mu = 16$, $n = 10$, $s = 2.05$, $\bar{x} = 18$, $\alpha = 0.01$

Null (H_0) $\Rightarrow \mu = 16$ Alternative $\Rightarrow \mu \neq 16$

$$t = \frac{\bar{x} - \mu}{SE} = \frac{18-16}{\dfrac{2.05}{\sqrt{10}}} = 3.08$$

$t_{critical} = 3.24$

As $t < t_{critical}$, we ~~reject~~ accept null with 99% confidence