Prob Assignment 3

21K-3280

Q1) $n > 30$ z-table

$\alpha = 0.1$

$s = 20 \text{ mins} = 1/3 \text{ hours}$

$n = 50$

$\bar{x} = 1.8$

$$1.8 - 1.645\left(\frac{1/3}{\sqrt{50}}\right) < \mu < 1.8 + 1.645\left(\frac{1/3}{\sqrt{50}}\right)$$

$$1.72 < \mu < 1.877$$

Estimated mean is less than the previous mean

Q2) $n = 10$ t value

$$1 - \frac{95}{100} = 0.05 = \alpha$$

$\bar{x} = 217.7$

$s = 17.480$

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$$\bar{x} - t\frac{\alpha}{2}\frac{s}{\sqrt{n}} < \mu < \bar{x} + t\frac{\alpha}{2}\frac{s}{\sqrt{n}}$$

$df = 10 - 1 = 9$

$$217.7 + 2.262\left(\frac{17.486}{\sqrt{10}}\right) = 230.2$$

$$217.7 - 2.262\left(\frac{17.486}{\sqrt{10}}\right) = 205.19$$

$205.19 < \mu < 230.2$

Q3) $h_0 = \mu = 42000$

$h_1 = \mu > 42000$ (one tail)

$\bar{x} = 43260$

$\alpha = 0.05$

$s = 5230$

using traditional testing Z test

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$$z = \frac{43260 - 42000}{5230/\sqrt{30}}$$

$z = 1.319$

actual prob = 1.645

Since $1.319 < 1.645$ so accept h_0

Q4) $\alpha = 0.05$

$6 = 28.7$

$\bar{x} = 31.5$

$n > 30$ z table

test statistic $= \frac{31.5 - 24}{28.7/\sqrt{50}} = 1.847$

$h_0 = \mu = 24$

$h_1 = \mu > 24$ (one tail)

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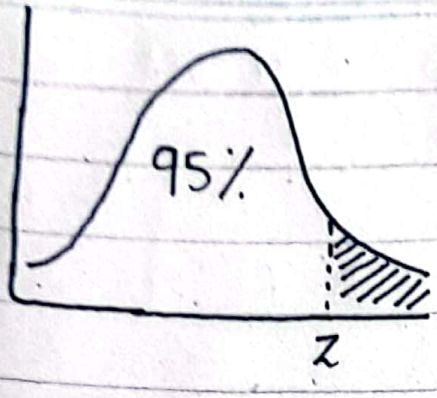

$P(Z = 1.847) = 0.0329$

p-value

p-value $< \alpha$ so reject h_0

Q5) Using hypothesis testing

$\alpha = 0.05$

$h_0 = \mu_1 = 5.8$

$h_1 = \mu_1 \neq 5.8 \rightarrow$ two tailed

actual $\mu(\bar{x}) = 3.85$, $df = 19$

using t test as $n < 30$

$s = 2.5188$

$$\text{test statistic} = \frac{\bar{x} - \mu}{s/\sqrt{n}} = \frac{3.85 - 5.8}{2.5188/\sqrt{20}}$$

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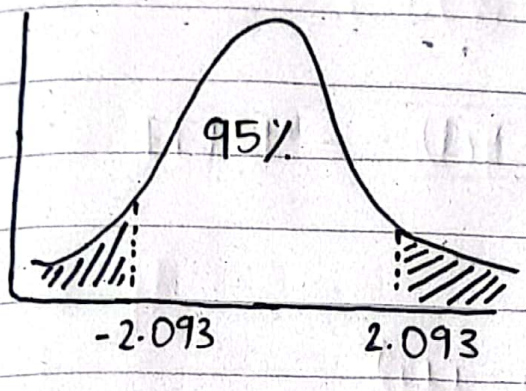
$= -3.46$

Actual prob = 2.093



Since $-3.046 < -2.093$ so reject h_0

Q6) Equal variance but unknown (pooled t-test)

$n_1 = 12$

$n_2 = 10$

$\bar{x}_1 = 85$

$\bar{x}_2 = 81$

$s_1 = 4$

$s_2 = 5$

$\alpha = 0.05$

$h_0 = \mu_1 - \mu_2 = 2$ (num)

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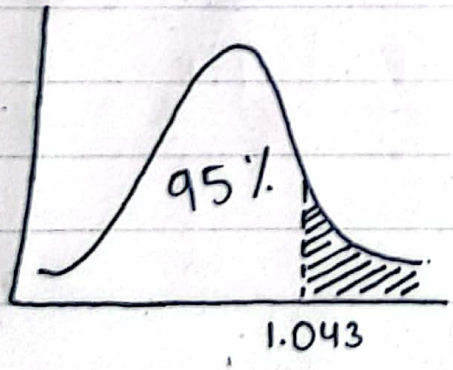
$h_1 = \mu_1 - \mu_2 > 2$ (alternate)
(one tail test)

$v = 20 \quad (10 + 12 - 2)$

$$sp = \sqrt{\frac{(4)^2(11) + (5)^2(9)}{10 + 12 - 2}} = 4.477$$

$$t = \frac{(\bar{x}_1 - \bar{x}_2) - (\mu_1 - \mu_2)}{sp\sqrt{1/n_1 + 1/n_2}}$$

$$t = \frac{(85 - 81) - 2}{4.477\sqrt{\frac{1}{12} + \frac{1}{10}}} = 1.043$$



$p = 0.16$ approx

$p \geq \alpha \Rightarrow$ do not reject h_0

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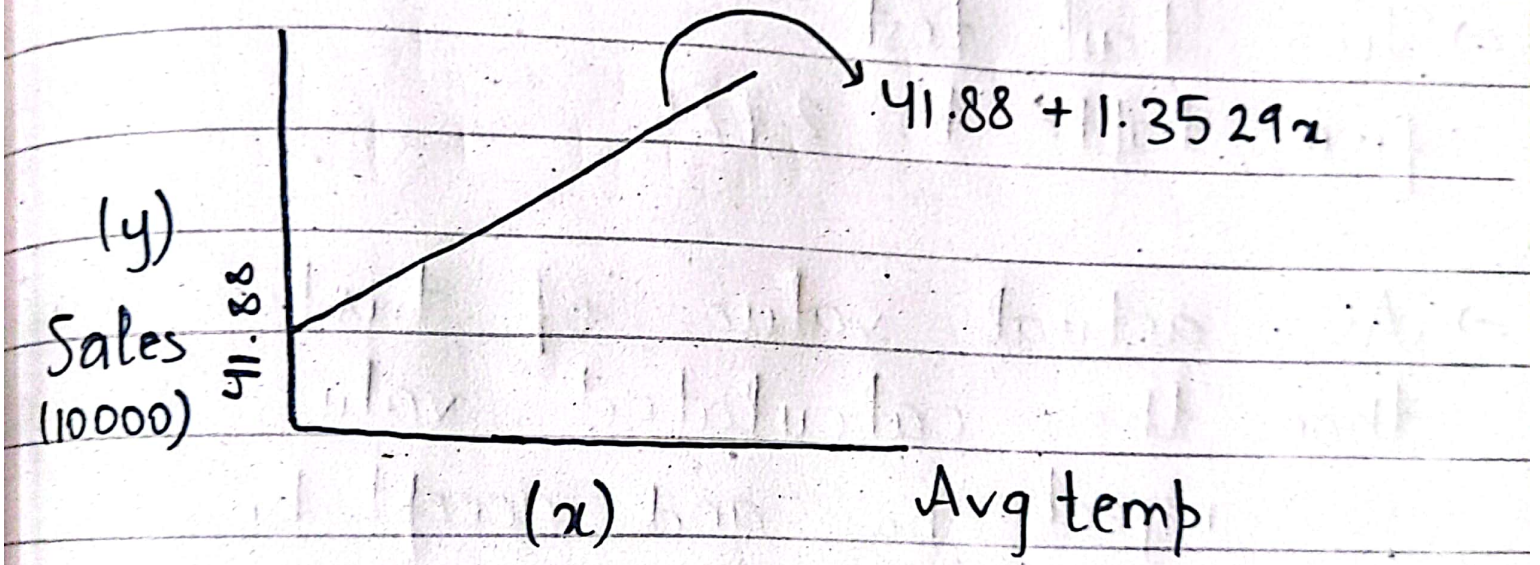
Q7) (a) $r = 0.8506$ (positive coorelation)

(b) $y = 41.88 + 1.3529\,x$



(c) $y = 41.88 + 1.3529(30)$

$y = 82.467$

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(d) $\alpha = 0.05$

$h_0 = \rho = 0$ (New hypothesis)
$h_1 = \rho \neq 0$ (alternate)

⇒ Performing t test

$$t = 0.8506 \sqrt{\frac{6-2}{1-(0.8506)^2}}$$

$df = 6-2 = 4$

$t = 3.2353$

⇒ Two tail test
from table $t = 2.726$

⇒ As actual value of t is less than the calculated value so reject h_0 and accept h_1

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Q8) (a) $y = b_0 + b_1 x$

$y = 42.58 - 0.686 x$

(b) for stress = 24.5

$y = 42.58 - 0.6860 (24.5)$

$= 25.773$

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