BASIL Ali KHAN

201K- 0477

Question # 01

$\overline{X_A} = 6.5$ years $6_A = 0.9$ $n_A = 36$

$\overline{Y_B} = 6$ years $6_B = 0.8$ $n_B = 49.$

$d_0 = 1$

$$ z = \frac{\left[\overline{X_A} - \overline{X_B}\right] - d_0}{\sqrt{\frac{(6_A)^2}{n_A} + \frac{(6_B)^2}{n_B}}} = \frac{(6.5 - 6) - 1}{\sqrt{\frac{(0.9)^2}{36} + \frac{(0.9)^2}{49}}} = \frac{-2.65}{(T.V)} $$

$$ P(z \leq -2.65) = 0.04 \ (CV) $$

Question # 02

$X \Rightarrow$ 9.8, 10.2, 10.4, 9.8, 10.0, 10.2, 9.6

95% $CI = ?$

Using calculator

$\overline{X} = 10$ $100(1-\alpha) = 95$

$\Sigma x = 70$ $1 - \alpha = 0.95$

$\Sigma x^2 = 700.48$ $\alpha = 0.05$

$n = 7$ $\alpha/2 = 0.025$

$\cancel{S_x} = 0.283$ $t_{\alpha/2, 6} = 2.447$

$\cancel{\cancel{0.025}}$

$\cancel{\cancel{0.025}}$

$$ \overline{x} - t_{\alpha/2} \frac{S}{\sqrt{n}} < M < \overline{x} + t_{\alpha/2} \frac{S}{\sqrt{n}} $$

$$ 10 - (2.447)\frac{(0.283)}{\sqrt{7}} < M < 10 + (2.447)\frac{(0.287)}{\sqrt{7}} $$

$$ 9.738 < M < 10.262 $$

Question #03

$X \Rightarrow .24, .22, .26, .34, .35, .32, .33, .29, .19, .36,$
$.30, .15, .17, .28, .38, .40, .37, .27$

99% CI = ?

From Calculator

$\bar{X} = 0.29$

$S_X = 0.074$

$n = 18$

$100(1-\alpha) = 99$

$1-\alpha = 0.99$

$\alpha = 0.01$

$+ \alpha/2 = 0.005$

$t\alpha/2, 17 = 2.898$

$\bar{X} - t\alpha/2 \cdot \dfrac{S}{\sqrt{n}} < \mu < \bar{X} + t\alpha/2 \cdot \dfrac{S}{\sqrt{n}}$

$(0.29) - (2.898)\dfrac{(0.074)}{\sqrt{18}} < \mu < (0.29) + (2.898)\dfrac{(0.074)}{\sqrt{18}}$

$0.239 < \mu < 0.341$

Question #04.

$n_1 = 15 \qquad \bar{X}_1 = 3.84 \qquad S_1 = 3.07$

$n_2 = 12 \qquad \bar{X}_2 = 1.49 \qquad S_2 = 0.80$

95% CI = ?

$100(1-\alpha) = 95$

$1-\alpha = 0.95$

$\alpha = 0.05$

$\alpha/2 = 0.025$

$$v = \dfrac{\left(\dfrac{(S_1)^2}{n_1} + \dfrac{(S_2)^2}{n_2}\right)^2}{\dfrac{\left(\dfrac{S_1^2}{n_1}\right)^2}{n_1-1} + \dfrac{\left(\dfrac{S_2^2}{n_2}\right)}{n_2-2}}$$

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$$v = \frac{\left(\dfrac{(3.07)^2}{15} + \dfrac{(0.80)^2}{12}\right)^2}{\dfrac{\left(\dfrac{3.07^2}{15}\right)^2}{14} + \dfrac{\left(\dfrac{0.80^2}{12}\right)^2}{11}}$$

$v = 16.3 \approx 17$

$t_{0.025, 17} = 2.110$

$$\bar{x_1} - \bar{x_2} - t_{\alpha/2}\sqrt{\frac{S_1^2}{n_1} + \frac{S_2^2}{n_2}} < M_1 \oplus M_2 < \bar{x_1} - \bar{x_2} + t_{\alpha/2}\sqrt{\frac{S_1^2}{n_1} + \frac{S_2^2}{n_2}}$$

$$2.35 - (2.110)\sqrt{\frac{3.07^2}{15} + \frac{0.80^2}{12}} < M_1 - M_2 < 2.35 + (2.110)\sqrt{\frac{3.07^2}{15} + \frac{0.80^2}{12}}$$

$0.608 < M_1 - M_2 < 4.092$

Question # 05

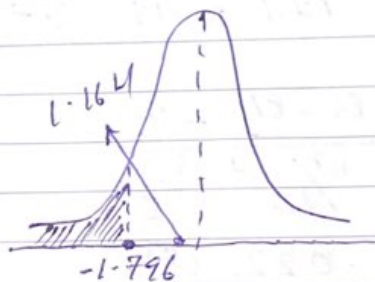$H_0 : M = 46 \ KW/h$

$H_1 : M < 46 \ KW/h$ (left tail test)

$n = 12$

$\bar{X} = 42 \ KW/h$

$\alpha = 0.05$

$S = 11.9$

$t_{0.05, 11} = -1.796 \ (C.V)$

1.164

-1.796

$t = \dfrac{\bar{X} - M}{S/\sqrt{12}}$

$t = -1.164 \ (TV)$

Donot reject H_0. $\Rightarrow$ TV $\otimes$ CV

Question #6

$n_1 = 12$ $\bar{X}_1 = 85$ $S_1 = 4$ $\alpha = 0.05$

$n_2 = 10$ $\bar{X}_2 = 81$ $S_2 = 5$

$d_0 = 2$

$H_0 : \mu_1 - \mu_2 = 1$

$H_1 : \mu - \mu_2 > 2$

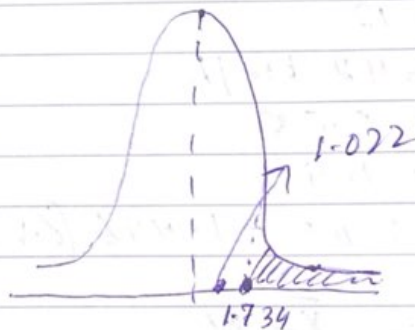$$v = \frac{\left[\left(\frac{S_1^2}{n_1}\right) + \left(\frac{S_2^2}{n_2}\right)\right]^2}{\dfrac{\left(\frac{S_1^2}{n_1}\right)^2}{n_1 - 1} + \dfrac{\left(\frac{S_2^2}{n_1}\right)^2}{n_2 - 1}}$$

$$U = \frac{\left[\frac{(4)^2}{12} + \frac{(5)^2}{10}\right]^2}{\dfrac{\left(\frac{(4)^2}{12}\right)^2}{11} + \dfrac{\left(\frac{5^2}{10}\right)^2}{9}}$$

$$v = 17.1 \approx 18 \ d.f$$

$$t = \frac{(85-81) - 2}{\sqrt{\frac{4^2}{12} + \frac{5^2}{10}}}$$

$$t = 1.022 \ (TV)$$

$t_{0.05, 18} = 1.734 \ (CV)$

$TV < CV$

Do not reject H_0

Question #07

(a)

	Q 1	Q 2	Q 3	Q4	Q 5	Q6
Anthony	85	92	97	65	75	96
Eric	81	79	76	84	83	77

ANTHONY

$\bar{X}_A = 85$

$n_A = 6$

$S_A = 12.76$

ERIC

$\bar{X}_E = 80$

$n_E = 6$

$S_E = 3.22$

$\alpha = 0.05$

$H_0 : M_A = M_E$

$H_1 : M_A \neq M_E$

$$Sp = \frac{S_A^2 (n_A - 1) + S_E^2 (n_E - 1)}{n_A + n_E - 2}$$

$$Sp^2 = \frac{(12.76)^2 (6-1) + (3.22)^2 (6-1)}{6+6-2}$$

$Sp^2 = 86.593$

$Sp = 9.31$

$d.f = \nu = n_A + n_E - 2 = 10$

$t_{0.05, 10} = $ ~~CD2~~ ~~(C.V)~~ $\cdot 2.228 (CV)$

$$t = \frac{(\bar{X}_A - \bar{X}_E) - d_0}{9.31 \sqrt{\frac{1}{6^2} + \frac{1}{6^2}}}$$

$$t = \frac{(85 - 80) - 0}{9.31 \sqrt{\frac{1}{6^2} + \frac{1}{6^2}}}$$

$t = 2.279 (T.V)$

Question #08

$n_A = 11$, $\bar{X}_A = 85$, $S_A = 4.7$
$n_B = 17$, $\bar{X}_B = 79$, $S_B = 6.1$

$H_0 : u_2 - u_1 = 8$
$H_1 : u_2 - u_1 \neq 8$

$$v = \frac{\left(\dfrac{(4.7)^2}{11} + \dfrac{6.1^2}{17}\right)^2}{\dfrac{\left(\dfrac{4.7^2}{11}\right)^2}{10} + \dfrac{\left(\dfrac{6.1^2}{17}\right)^2}{16}}$$

$v = 25.86 = 26$ d.f

$\alpha = 0.05$
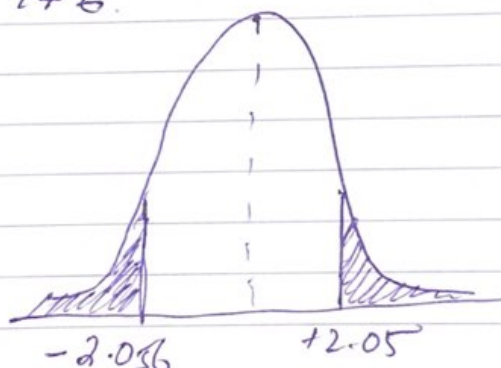$\alpha/2 = 0.025$
$t_{\alpha/2, 26} = 2.056$ (CV)

$$t = \frac{(85 - 7.9) - 8}{\sqrt{\dfrac{4.7^2}{17} + \dfrac{6.12}{12}}}$$

$t = -0.976.$

-2.056 $+2.05$

$-t_{\alpha/2, 26} < t < t_{\alpha/2, 26}$

don't reject H_0.