

Subject :

No. :

Date :/...../.....

9.

(1)

$$S = \sqrt{\frac{\sum (x_i - \bar{x})^2}{n-1}} = \sqrt{\frac{\sum x_i^2 - n\bar{x}^2}{n-1}}$$

$$= \sqrt{\frac{1284 - 6 \times 14.33^2}{5}}$$

$$= \sqrt{10.38} = 3.22$$

(2)

$$1 - \alpha = 0.9 \quad \frac{\alpha}{2} = 0.05 \quad n = 1 = 5$$

$$\chi^2_{\frac{\alpha}{2}} (n-1) = \chi^2_{0.05} (5) = 11.07$$

$$\chi^2_{1-\alpha} (n-1) = \chi^2_{0.95} (5) = 1.15$$

$$\left(\sqrt{\frac{(n-1)S^2}{\chi^2_{\frac{\alpha}{2}} (n-1)}}, \sqrt{\frac{(n-1)S^2}{\chi^2_{1-\alpha} (n-1)}} \right) = \left(\sqrt{\frac{5 \times 10.38}{11.07}}, \sqrt{\frac{5 \times 10.38}{1.15}} \right)$$

$$= (2.17, 6.12)$$

20.

$$(1) \quad \left(\frac{S_1^2}{n_1} + \frac{S_2^2}{n_2} \right)^2 \quad n_1 = 9 \quad \bar{x} = 7.67 \quad S_1 = 9.27$$

$$n_2 = 9 \quad \bar{y} = 6.78 \quad S_2 = 21.15$$

$$V = \frac{\left(\frac{S_1^2}{n_1} + \frac{S_2^2}{n_2} \right)^2}{\left(\frac{S_1^2}{n_1} \right)^2 + \left(\frac{S_2^2}{n_2} \right)^2} = \frac{\left(\frac{9.27^2}{9} + \frac{21.15^2}{9} \right)^2}{\left(\frac{9.27^2}{9} \right)^2 + \left(\frac{21.15^2}{9} \right)^2} = 10.96 \approx 11$$

$$(\bar{x} - \bar{y}) \pm t_{\frac{\alpha}{2}} (v) \sqrt{\frac{S_1^2}{n_1} + \frac{S_2^2}{n_2}} = (7.67 - 6.78) \pm t_{0.025} (11) \sqrt{\frac{9.27^2}{9} + \frac{21.15^2}{9}}$$

$$= 0.89 \pm 2.201 \times 7.70$$

$$= 0.89 \pm 16.95$$

(2)

$$\left(\sqrt{\frac{8 \times 9.27^2}{\chi^2_{0.05} (8)}}, \sqrt{\frac{8 \times 9.27^2}{\chi^2_{0.95} (8)}} \right)$$

$$= \sqrt{\frac{687.46}{15.51}}, \sqrt{\frac{687.46}{2.73}}$$

$$= (6.66, 15.87)$$

(3)

$$\left(\frac{S_1^2}{S_2^2} \times \frac{1}{\sqrt{\frac{\alpha}{2}} (n_1-1, n_2-1)}, \frac{S_1^2}{S_2^2} \times \frac{1}{1 - \sqrt{\frac{\alpha}{2}} (n_1-1, n_2-1)} \right)$$

$$= \left(\frac{9.17^2}{21.15^2} \times \frac{1}{3.44}, \frac{9.27^2}{21.15^2} \times \frac{1}{3.44} \right)$$

$$= (0.06, 0.66)$$

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3.

$$n=10 \quad \bar{x}=13.63 \quad s=6.05 \quad n-1=9 \quad 1-\alpha=0.98 \quad \frac{\alpha}{2}=0.01$$

$$\bar{x} \pm t_{\frac{\alpha}{2}} (n-1) \frac{s}{\sqrt{n}} = 13.63 \pm t_{0.01} (9) \frac{6.05}{\sqrt{10}}$$

$$= 13.63 \pm 2.821 \times 1.91$$

$$= 13.63 \pm 5.39$$

$$(8.24, 19.02)$$