20.

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

$n_1 = 9,\ \bar{x} = 7.67,\ S_1 = 9.27$

$n_2 = 9,\ \bar{y} = 6.98,\ S_2 = 21.15$ 且 $\sigma_1^2 \neq \sigma_2^2$

$\Rightarrow V = \dfrac{\left(\frac{9.27^2}{9} + \frac{21.15^2}{9}\right)^2}{\frac{\left(\frac{9.27^2}{9}\right)^2}{8} + \frac{\left(\frac{21.15^2}{9}\right)^2}{8}}$

$= 10.96 \doteq 11.$

$\therefore \mu_1 - \mu_2$ 之 95% 信賴區間為

$\Rightarrow (7.67 - 6.98) \pm t_{0.025}(11)\sqrt{\frac{9.27^2}{9} + \frac{21.15^2}{9}}$

$\Rightarrow 0.89 \pm 2.201 \times 7.17 = 0.89 \pm 16.95$ 即 $(-16.06, 17.84)$ #.

(2) $1-\alpha = 0.9$. $\chi^2_{\frac{\alpha}{2}}(n_1-1) = \chi^2_{0.05}(8) = 15.51$. $\chi^2_{1-\frac{\alpha}{2}}(n_1-1) = \chi^2_{0.95}(8) = 2.73$

σ_1 之 90% 信賴區間為

$\left(\sqrt{\frac{8 \times 9.27^2}{\chi^2_{0.05}(8)}}, \sqrt{\frac{8 \times 9.27^2}{\chi^2_{0.95}(8)}}\right) = (6.66, 15.87)$ #

(3) $F_{\frac{\alpha}{2}}(n_1-1, n_2-1) = F_{0.05}(8,8) = 3.44$

$F_{1-\frac{\alpha}{2}}(n_1-1, n_2-1) = F_{0.95}(8,8) = \dfrac{1}{F_{0.95}(8,8)} = 0.29.$

$\therefore \dfrac{\sigma_1^2}{\sigma_2^2}$ 之 90% 信賴區間為

$\Rightarrow \left(\frac{9.27^2}{21.15^2} \times \frac{1}{3.44}, \frac{9.27^2}{21.15^2} \times \frac{1}{0.29}\right)$

$= (0.06, 0.66)$ #.

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9. 15. 18. 9. 13. 17. 14.

(1) $S = \sqrt{\frac{\sum (x_i - \bar{x})^2}{n-1}} = \sqrt{\frac{\sum x_i^2 - n\bar{x}^2}{6-1}}$

$= \sqrt{\frac{1284 - 6 \times 14.33^2}{5}} = \sqrt{10.38} \doteq 3.22.$

$\therefore$ σ 点估計為 3.22. #

(2). $1-\alpha = 0.9$. $\frac{\alpha}{2} = 0.05$. $n-1 = 5$.

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

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

α 之 90% 信賴區間為 $\left(\sqrt{\frac{51.9}{11.07}}, \sqrt{\frac{51.9}{1.15}} \right)$

$= (2.17, 6.72)$. #