EX 02

$H_0 : \sigma_0^2 = 0.0002$

$H_a : \sigma^2 > \sigma_0^2$

$s^2 = 0.0003 \quad n = 10$

$\alpha = 0.05$

$$\chi^2 = \frac{(n-1)s^2}{\sigma_0^2} = 9 \cdot \left(\frac{0.0003}{0.0002}\right)$$

$$= 9 \times \frac{3}{2}$$

$$\chi^2 = 13.5$$

$$P(\chi^2_{9\,dof} \geq 13.5) = \boxed{0.141 \rightarrow p \text{ value}}$$

$P = 0.141 > 0.05$

$\therefore$ we accept H_0 at 5% level

(sample is not problematic)

Ex13

$n_1 = 10$ $\quad\quad$ $n_2 = 20$

$s_1^2 = 0{,}0003$ $\quad\quad$ $s_2^2 = 0{,}0001$

$H_0: \sigma_1^2 = \sigma_2^2$

$H_a: \sigma_1^2 > \sigma_2^2$

$$F = \frac{(n_1-1)s_1^2}{\sigma_1^2(n_1-1)} \Big/ \frac{(n_2-1)s_2^2}{\sigma_2^2(n_2-1)}$$

$$= \frac{s_1^2 \sigma_2^2}{s_2^2 \sigma_1^2}$$

$$\cancel{= \frac{0{,}0003}{0{,}0001}}$$

under $H_0: \sigma_1 = \sigma_2$ $\quad \therefore F = \frac{s_1^2}{s_2^2}$

$$= \frac{0{,}0003}{0{,}0001}$$

$$= 3$$

$$P(\underset{n_1-1,\, n_2-1}{F} \geq 3) = P(F_{9,19} \geq 3)$$

dof

$$= \boxed{0{,}021 \Rightarrow P \text{ value}}$$

$p = 0{,}021 < 0{,}05$ $\therefore$ we reject H_0 & acept

H_a at 5 % level, i.e sufficient info to indicate competitor has smaller variance