

$$1) \sum xy = 182500 \quad \sum x = 850 \quad \sum xy = 349.15$$

$$\sum x^2 = 92500 \quad \sum y = 1737 \quad \hat{\beta} = \frac{\sum xy}{\sum xx} = 1.724197 \quad S_{xx} = 2080$$

$$\therefore \alpha = y - \beta x = 27.14317$$

$$\therefore y = 27.14317 + 1.724197x$$

$$2) S_{xy} = 875.16 \quad S_{xx} = 301.66 \quad S_{yy} = 6409.7125$$

$$\hat{\beta} = 2.90115 \quad \hat{\alpha} = 3.24809$$

$$\hat{y} = 3.24809 + 2.90115x$$

$$\frac{\hat{\beta} - \beta}{\sqrt{\frac{\hat{\sigma}^2}{S_{xx}}}} \sim t_{n-2}$$

$$95\% \text{ CI } (\hat{\beta}) = \hat{\beta} \pm t_{10, 2.5\%} \sqrt{\frac{\hat{\sigma}^2}{S_{xx}}}$$

$$\hat{\sigma}^2 = \frac{SS_{\text{res}}}{n-2} = 382.07447$$

$$\therefore 95\% \text{ CI } (\hat{\beta}) = (0.377365, 4.24)$$

$$\frac{\hat{\alpha} - \alpha}{\text{se}(\hat{\alpha})} \sim t_{n-2}$$

$$\text{se}(\hat{\alpha}) = 10.59894$$

$$\hat{\alpha} = 119.78409$$

$$\therefore 95\% \text{ CI } (\hat{\alpha}) = (98.17866, 143.40852)$$

$$3) SS_{\text{tot}} = 1116.11 \quad SS_{\text{reg}} = 516.11 \quad S_{\text{res}} = 600$$

Source	DF	SS	MSS
Reg	3	516.11	172.04
res	24	600	25
tot	27	1116.11	

$$F = \frac{172.04}{25} = 6.88$$

$$T.S = 6.88$$

$$F_{3,24,5\%} = 3.009$$

$$4) \sum y_{ij} = 1856 \quad \sum y_{ij}^2 = 124316 \quad DF = 104385.94$$

$$SS_{\text{tot}} = 69930.06 \quad SS_{\text{reg}} = 22325.61 \quad S_{\text{res}} = 47604.37$$

$$TS = 3.283$$

$$F_{0,29,5\%} = 2.214 \quad \therefore \text{reject } H_0$$

$$TS = 49.91146$$

$$\chi^2_{0,5\%} = 12.59 \quad \therefore \text{reject } H_0$$

g)	rate	$\bar{x}$	var	y_i^2
1		2.722	0.163	80.582
2		4.822	0.121	207.638
3		5.711	0.181	294.053
4		6.525	0.148	473388.6

$$TS = 45.638$$

$$F_{3,1,1\%} = 2.951$$

$$6) S_{xy} = 661.2 \quad S_{xx} = 54.9 \quad S_{yy} = 8923.6$$

$$r = \frac{S_{xy}}{\sqrt{S_{xx} S_{yy}}} = 0.94466 \quad \hat{\beta} = 12.04371$$

$$\hat{\alpha} = 9.2295$$

$$\hat{y} = 9.2295 + 12.04371x$$

$$R^2 = \frac{S_{xy}^2}{S_{xx} S_{yy}} = 89.237703$$

$$7) S_{xx} = 4288.4221 \quad S_{xy} = 2126.84 \quad S_{yy} = 1199.20767$$

$$\hat{\beta} = 0.45431$$

$$\hat{\alpha} = 10.78056$$

$$\hat{y} = 10.78056 + 0.45431x$$

$$H_0: \beta = 0 \quad H_1: \beta \neq 0 \quad \frac{\hat{\beta} - \beta}{\sqrt{\hat{\sigma}^2 / S_{xx}}} \sim t_{n-2}$$

$$T.S. = \frac{\hat{\beta} - 0}{\sqrt{\hat{\sigma}^2 / S_{xx}}} = 6.675$$

$\therefore$ reject H_0

$$t_{9, 2.25\%} = 2.261$$

9) $S_{xx} = 75$ $S_{yy} = 24824$ $S_{xy} = 296$ $r = 0.680002$
 $H_0: \rho = 0$ $H_1: \rho < 0$

$$\frac{\tan^{-1}(r) - \tan^{-1}(\rho)}{\sqrt{1/n-3}} \sim N(0,1)$$

$Z_{cal} = -2.07893$ $Z_{tab} = 1.6449$ $\therefore$ reject H_0

$\hat{\beta} = -3.94667$ $\hat{\alpha} = 82.16$ $\therefore$ $y = 82.16 - 3.94667x$

$$R^2 = \frac{S_{xy}^2}{S_{xx} S_{yy}} = 97.05983\%$$

10) $S_{xx} = 0.0042$ $S_{yy} = 0.00126$ $S_{xy} = 0.0022$
 $SS_{tot} = 0.00126$ $SS_{reg} = 0.00115$ $SS_{res} = 0.00011$

Source	df	SS	MSS
Reg	1	0.00115	0.00115
Res	1	0.00011	0.00011
Total	2	0.00126	

$H_0: \rho = 0$ $H_1: \rho \neq 0$

T.S = 10.45455

$F_{1,1, 99.9} = 161.4$

$\therefore$ do not reject H_0