

1.  $\hat{y} = 25 + 0.12x \Rightarrow b_1 = 0.12$  (positive) (1B)

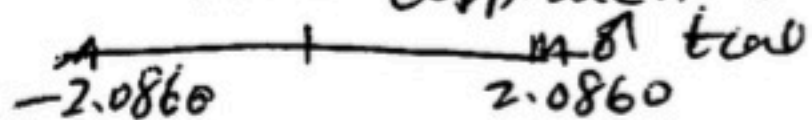
2.  $S = \sqrt{\frac{SSE}{n-2}} = \sqrt{\frac{SST-SSR}{n-2}} = \sqrt{\frac{2500-2320}{22-2}} = 3$

$\Rightarrow S_{b1} = \frac{S}{\sqrt{\sum(x_i - \bar{x})^2}} = \frac{3}{\sqrt{3906.25}} = 0.048$

$t_{cal} = \frac{b_1}{S_{b1}} = \frac{0.12}{0.048} = 2.5$  (2D)

DF = n - 2 = 20

3. Critical Value Approach: CV:  $\pm t_{\frac{\alpha}{2}} = \pm t_{0.025} = \pm 2.0860$



reject  $H_0$ , there is a significant linear relationship between x and y (3A)

4.  $b_1 \pm t_{\frac{\alpha}{2}} S_{b1} \Rightarrow 0.12 \pm 2.0860 \times 0.048 = [0.1020, 0.2220]$

5.  $\hat{y} = 25 + 0.12 \times 160 = 44.2$  (5A)

(4B)

6.  $r^2 = \frac{SSR}{SST} = \frac{2320}{2500} = 0.928$ : 92.8% of the variation in y can be explained by the variation in x (6C)

7.  $S_{yp} = S \sqrt{\frac{1}{n} + \frac{(x_p - \bar{x})^2}{\sum(x_i - \bar{x})^2}} = 3 \times \sqrt{\frac{1}{22} + \frac{(160 - 169.9)^2}{3906.25}} = 0.797$   
 $\Rightarrow 44.2 \pm 2.0860 \times 0.797 = [42.54, 45.86]$  (7C)

8-9

$f_{ij}$	$e_{ij}$	$(f_{ij} - e_{ij})^2 / e_{ij}$
150	$\frac{396 \times 250}{750} = 132$	$(150 - 132)^2 / 132$
150	$\frac{396 \times 300}{750} = 158.4$	$(150 - 158.4)^2 / 158.4$
96	$\frac{396 \times 200}{750} = 105.6$	$(96 - 105.6)^2 / 105.6$
100	$\frac{354 \times 250}{750} = 118$	$(100 - 118)^2 / 118$
150	$\frac{354 \times 300}{750} = 141.6$	$(150 - 141.6)^2 / 141.6$
104	$\frac{354 \times 200}{750} = 94.4$	$(104 - 94.4)^2 / 94.4$

9. DF = k - 1 = 2

CV:  $\chi^2_{\alpha} = \chi^2_{0.01} = 9.210$

$\chi^2 = 7.993 < 9.210$

fail to reject  $H_0$

(9D)

P-value method:

DF	0.025	0.01
2	7.378	9.210

test stat =  $\chi^2 = 7.993$

(8B)

P-value = 0.01 > 0.025 >  $\alpha = 0.01$