ECO TUT

2)

X	Y	X^2	XY	$\hat{Y}_t$	$(\hat{Y}_t - \bar{Y})^2$	$(Y_t - \bar{Y})^2$
260	150	67600	39000	158.01	2444.21	1716.36
80	70	6400	5600	64.41	1950.19	1482.72
240	155	57600	37200	147.61	1524.04	2155.65
100	65	10000	6500	74.81	1139.81	1898.43
160	110	25600	17600	106.01	6.55871	2.04204
180	115	32400	20700	116.41	61.45	41.3321
140	95	19600	13300	95.61	167.987	184.172

$\Sigma x = 1160$ $\quad \Sigma y = 760$

$\Sigma x^2 = 219200$

$\Sigma xY = 139900$

$$\bar{Y} = \frac{\Sigma y}{n} = \frac{760}{7} = 108.571$$

$\cancel{\Sigma (Y_t - Y)^2}$

Eq 1: $760 = 7a + 1160b$

Eq 2: $139900 = 1160a + 219200b$

$a = 22.81$ & $b = 0.524$

$$\boxed{Y = 22.81 + 0.52x}$$

$$\Sigma (\hat{Y}_t - \bar{Y})^2 = 7294.24$$

$$\Sigma (Y_t - \bar{Y})^2 = 7485.71$$

$$R^2 = \frac{\Sigma (\hat{Y}_t - \bar{Y})^2}{\Sigma (Y_t - \bar{Y})^2} = \frac{7294.24}{7485.71} = 0.974$$

Interpret: 97.4% variation in consumer expenditure is explained by income

7) $\Sigma x_i = 130$ $\Sigma Y_i = 70$, $\Sigma x^2 = 1818$

$\Sigma x_i y_i = 949$.

So,

Eq 1: $70 = 10a + 130b$

Eq 2 ⇒ $949 = 130a + 1818b$

$a = 3.04$

$b = 0.304$

$$\boxed{Y = 3.04 + 0.304x}$$

Degree of freedom $= n-k-1 = 10-1-1$

$= \boxed{8}$

$\Sigma (Y_t - \hat{Y}_t)^2 = 27.34$

$\bar{X} = \frac{\Sigma x_i}{10} = 1.3$

X	Y	~~$(X-\bar{X})^2$~~
13	6.2	
6	8.6	
14	7.2	
11	4.5	
17	9.0	
9	3.5	
13	6.5	
17	9.3	
18	9.5	
12	5.7	

$\Sigma (x_t - \bar{x}_t)^2 = 128$

So,

$$S_b = \sqrt{\frac{\Sigma (Y_t - \hat{Y})^2}{(n-k-1) \cdot \Sigma (x_t - \bar{x})^2}}$$

$$S_b = \sqrt{\frac{27.34}{8 \times 128}}$$

$$S_b = \sqrt{0.026} = 0.16$$

$$t_8 = \frac{b}{S_b} = \frac{0.304}{0.16}$$

$$t_8 = 1.9$$

As

$t_{cal} < t_{tabe} \Rightarrow$ So, Relationship is not significant

4)

X	Y	$(X_t - \bar{X})$	$(Y_t - \bar{Y})$	$(X_t - \bar{X})(Y_t - \bar{Y})$
117	2.07	−9.167	−0.85667	7.8531
128	2.80	1.833	−0.12667	−0.232186
127	3.14	0.833	0.21333	0.17704
119	2.26	−7.167	−0.6667	4.78
131	3.40	4.833	0.47333	2.2876
135	3.89	8.83	0.96333	8.50909

$$\Sigma(Y_t - \bar{Y})^2 = 2.39$$

$$Y = -9.31 + 0.09X$$

$\bar{X} = 126.167$

$\bar{Y} = 2.92667$

For $X = 120$

$$Y = 1.49$$

$$\Sigma(X_t - \bar{X})(Y_t - \bar{Y}) = 23.35$$

$$S_e = \sqrt{\frac{\Sigma(Y_t - \bar{Y})^2 - b\Sigma(X_t - \bar{X})(Y_t - \bar{Y})}{n-k-1}}$$

$$= \sqrt{\frac{2.39 - 0.09 \times 23.35}{6-1-1}} = \sqrt{0.072}$$

$$\boxed{S_E = 0.2683}$$

Range of Y : $Y \pm t * S_E$

$= 1.49 \pm 2.132 * 0.2683$

Range of Y $\Rightarrow$ $\boxed{0.91 \text{ to } 2.60}$