Question 1-ab

$\bar{x} = 2, \bar{y} = 5.5$
$b = 2.78$
$a = 5.5 - 2.78 * 2 = -0.06$

a) $\hat{y} = -0.06 + 2.78x$

b) $s_{xy} = 6.95, s_{xx} = 2.5, s_{yy} = 19.52$

$$\Rightarrow r = \frac{6.95}{\sqrt{19.52 * 2.5}} = 0.995$$

$$b = \frac{\sum_{i=1}^{n}(x_i - \bar{x})(y_i - \bar{y})}{\sum_{i=1}^{n}(x_i - \bar{x})^2}$$

$$a = \bar{y} - b\bar{x}$$

$$S_{xx} = \sum_{i=1}^{n}(x_i - \bar{x})^2 = \sum_{i=1}^{n}x_i^2 - \frac{1}{n}\left(\sum_{i=1}^{n}x_i\right)^2$$

$$S_{yy} = \sum_{i=1}^{n}(y_i - \bar{y})^2 = \sum_{i=1}^{N}y_i^2 - \frac{1}{n}\left(\sum_{i=1}^{n}y_i\right)^2$$

→ corrected sums of squares

$$S_{xy} = \sum_{i=1}^{n}(x_i - \bar{x})(y_i - \bar{y}) = \sum_{i=1}^{n}x_i y_i - \frac{1}{n}\left(\sum_{i=1}^{n}x_i\right)\left(\sum_{i=1}^{n}y_i\right)$$

→ corrected sums of cross product

$$r = \frac{S_{xy}}{\sqrt{S_{xx}S_{yy}}}$$

Question 1-c

- df=n-2=3 $\Rightarrow t_{\alpha/2} = t_{0.05} = 2.353$
- $\hat{y}_0 = -0.06 + 2.78 * 1.8 = 4.94$

$$4.94 \pm 2.353 * 0.258\sqrt{1 + \frac{1}{5} + \frac{(1.8 - 2.0)^2}{2.50}}$$

$= 4.94 \pm 2.353 * 0.258 * 1.1027$

$= 4.94 \pm 0.669$

$= 4.271 , 5.609$

$$\text{P.I for } y_0 = \hat{y}_0 \pm t_{\alpha/2}s\sqrt{1 + \frac{1}{n} + \frac{(x_0 - \bar{x})^2}{S_{xx}}}$$