Simple linear regression

| $i$ | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
|---|---|---|---|---|---|---|---|---|---|
| $x_i$ | 1.5 | 1.8 | 2.4 | 3.0 | 3.5 | 3.9 | 4.4 | 4.8 | 5.0 |
| $y_i$ | 4.8 | 5.7 | 7.0 | 8.3 | 10.9 | 12.4 | 13.1 | 13.6 | 15.3 |

(1) Estimate the regression line for the data

$\sum_{i=1}^{9} x_i =$ $\sum_{i=1}^{9} y_i =$ $\sum_{i=1}^{9} x_i y_i =$

$\sum_{i=1}^{9} x_i^2 =$ $\bar{x} =$ $\bar{y} =$

$\hat{\beta} =$

$\hat{\alpha} =$

Thus, the estimated regression line is given by

(2) Find a 95% confidence interval for $\beta$.

$S_{xx} =$

$S_{yy} =$

$S_{xy} =$

$s^2 =$

$t_{0.025} =$ for degrees of freedom

Therefore, a 95% confidence interval for $\beta$ is given by

(3) Test the hypothesis that $\beta = 2.5$ at the 0.01 level of significance against the alternative that $\beta > 2.5$.

$H_o$: against $H_1$:

Critical region: $T >$

Computations:

$t =$

Conclusion:

(4) Construct 95% confidence limits for the mean response $\mu_{Y|x}$ at $x_o = 2$.

$\hat{y}_o =$

Therefore, a 95% confidence interval for $\mu_{Y|2}$ is given by

(5) Construct a 95% confidence interval for $y_o$ when $x_o = 2$.

Therefore, a 95% confidence interval for $y_o$ is given by