

Part a

The function should be: $Y = X\beta + \epsilon$

$$y = \beta_0 + \beta_1 x_1 + \beta_2 x_2 + \epsilon$$

Part b

$$\beta = (X^T X)^{-1} X^T Y$$

$$Y = \begin{bmatrix} 7.5 \\ 15.0 \\ 22.0 \\ \vdots \\ 50.0 \\ 51.9 \end{bmatrix}_{36 \times 1}$$

$$X = \begin{bmatrix} 1 & 0.00 & 10 \\ 1 & 0.00 & 50 \\ 1 & 0.00 & 85 \\ \vdots & \vdots & \vdots \\ 1 & 0.05 & 120 \\ 1 & 0.05 & 150 \end{bmatrix}_{36 \times 3}$$

Part c

$$\beta = (X^T X)^{-1} X^T Y$$

The least squares estimated β is

$$\beta = \begin{bmatrix} 11.0869804 \\ 350.1192457 \\ 0.1089344 \end{bmatrix} \begin{matrix} \rightarrow \beta_0 \\ \rightarrow \beta_1 \\ \rightarrow \beta_2 \end{matrix}$$

$$y = 11.087 + 350.119 x_1 + 0.109 x_2 + \epsilon$$