ASSIGNMENT # 6 COEN 240 ML

1. MULTILINEAR REGRESSION ANALYSIS

$p = 2$; $n = 3$

$x_1 = (1, 2)$; $y_1 = 1$

$x_2 = (-3, 2)$; $y_2 = 2$

$x_3 = (2, -1)$; $y_3 = -1$

ESTIMATE $\beta = [\beta_0 \ \beta_1 \ \beta_2]^T$

SOLUTION

$$X = \begin{bmatrix} 1 & 1 & 2 \\ 1 & -3 & 2 \\ 1 & 2 & -1 \end{bmatrix} \quad ; \quad Y = \begin{bmatrix} 1 \\ 2 \\ -1 \end{bmatrix}$$

$$X^T = \begin{bmatrix} 1 & 1 & 1 \\ 1 & -3 & 2 \\ 2 & 2 & -1 \end{bmatrix} \quad ; \quad X^T X = \begin{bmatrix} 3 & 0 & 3 \\ 0 & 14 & -6 \\ 3 & -6 & 9 \end{bmatrix}$$

$$(X^T X)^{-1} = \begin{bmatrix} 5/8 & -1/8 & -7/24 \\ -1/8 & 1/8 & 1/8 \\ -7/24 & 1/8 & 7/24 \end{bmatrix} \quad ; \quad X^T Y = \begin{bmatrix} 2 \\ -7 \\ 7 \end{bmatrix}$$

$$\hat{\beta} = (X^T X)^{-1} (X^T Y) = \begin{bmatrix} 1/2 \\ -1/4 \\ 7/12 \end{bmatrix}$$

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