

Consider a model  $y = \beta_0 + \beta_1 x + \varepsilon$ . The data are as follows:

x	1	2	3	4	5
y	1	1	2	2	4

- (a) Express the model in matrix form.
- (b) Find the least-squares estimates of the model parameters.
- (c) Calculate the hat matrix.
- (d) Calculate  $MS_{Res}$ .

Hint:

$$\hat{\beta}_0 = -0.1 \text{ and } \hat{\beta}_1 = 0.7.$$

$$H = \begin{bmatrix} 0.6 & 0.4 & 0.2 & 0 & -0.2 \\ 0.4 & 0.3 & 0.2 & 0.1 & 0 \\ 0.2 & 0.2 & 0.2 & 0.2 & 0.2 \\ 0 & 0.1 & 0.2 & 0.3 & 0.4 \\ -0.2 & 0 & 0.2 & 0.4 & 0.6 \end{bmatrix}$$

$$MS_{Res} = 1.1/3 = \mathbf{0.37}$$