

Indian Institute of Technology Guwahati
Statistical Inference and Multivariate Analysis (MA324)
Problem Set 10

1. Show that the residual from a linear regression model can be expressed as $\mathbf{e} = (I - H) \boldsymbol{\varepsilon}$.
2. Consider the linear regression $y = \beta_0 + \beta_1 x_1 + \dots + \beta_p x_p + \epsilon$, with usual assumptions on ϵ . Assuming that X is a full column rank matrix, show that

$$\sum_{i=1}^n \text{Var}(\hat{y}_i) = (p+1)\sigma^2.$$

3. Show that $0 \leq h_{ii} \leq 1$.
4. Show that $e_{(i)} = \frac{e_i}{1-h_{ii}}$.