$$TSS = ESS + RSS$$

$$\sum_{i=1}^{n}(y_i - \bar{y})^2 = \sum_{i=1}^{n}(\hat{y}_i - \bar{y})^2 + \sum_{i=1}^{n}(\hat{y}_i - y_i)^2$$

$$R^2 = \frac{ESS}{TSS} = \text{prop. of SS explained}$$

$$\in (0,1)$$

$$cov(e) = cov(Y - \hat{Y}) = cov(Y - HY)$$
$$= cov(\underbrace{(1-H)}_{C} \cdot Y) = (1-H) \cdot \underbrace{cov(Y)}_{\sigma^2 \cdot I}(1-H)^T$$

$$= \sigma^2 (I-H)(I-H^T) = \sigma^2 (I - H - \underbrace{H^T}_{H} + \underbrace{HH^T}_{H})$$

$$\underline{\sigma^2 (I-H)}$$