ANOVA (Analysis of Variance) table

In general:

Source	df (degrees of freedom)	SS (sum of squares)	MS (mean squares)	F (Fisher test statistic)	p-value
Regression (Model)	$k = p-1$	$SS_{Regression}$	$MS_{Reg} = \frac{SS_{Reg}}{k}$	MS_{Reg} / MS_{Error}	.....
Residuals (Errors)	$n-p$	SS_{Errors}	$MS_{Error} = \frac{SS_{Errors}}{n-p}$		
Total	$n-1$	SS_{Total}			

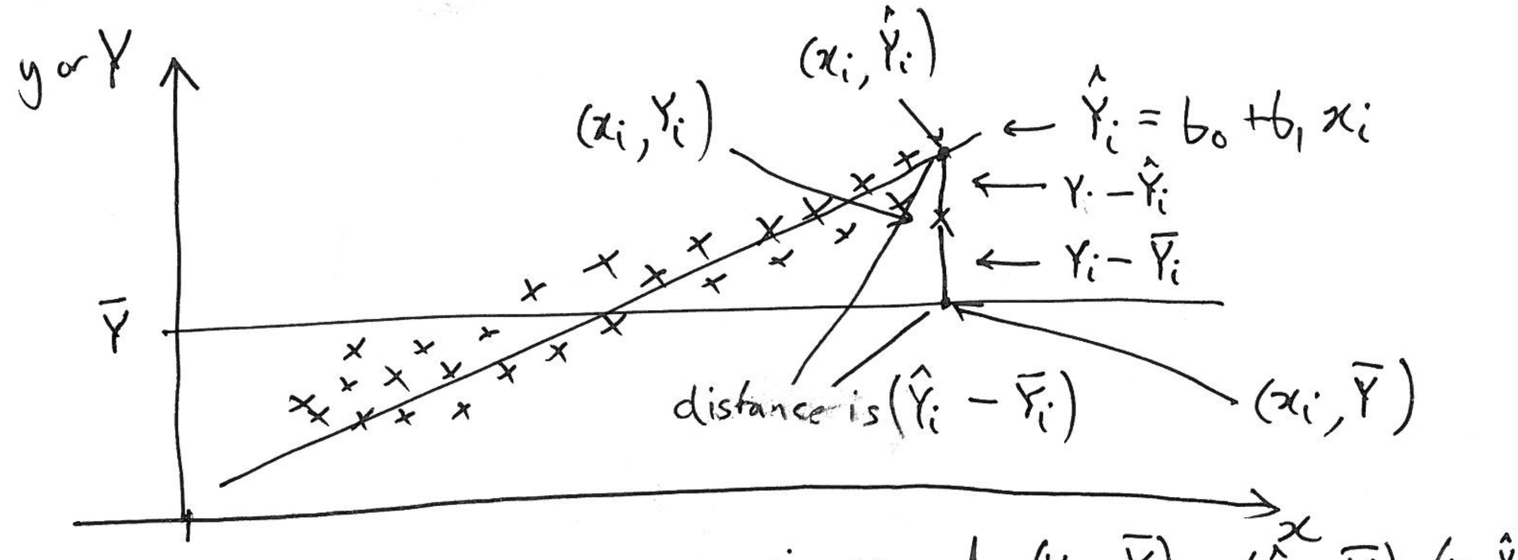
p = # parameters in the model $\{\beta_0, \beta_1, \beta_2 \dots \beta_k\}$

k = # variables or # slope coefficients (excl. β_0) $\{\beta_1, \dots \beta_k\}$

For simple linear regression ($p = 2$; β_0, β_1 & $k = 1$; β_1)

Source	df	SS	MS	F
Regression	1	$\sum(\hat{Y}_i - \bar{Y})^2$	$\sum(\hat{Y}_i - \bar{Y})^2 / 1$	$\div$ by
Residuals	$n-2$	$\sum(Y_i - \hat{Y}_i)^2$	$\frac{\sum(Y_i - \hat{Y}_i)^2}{n-2}$	
Total	$n-1$	$\sum(Y_i - \bar{Y})^2$		

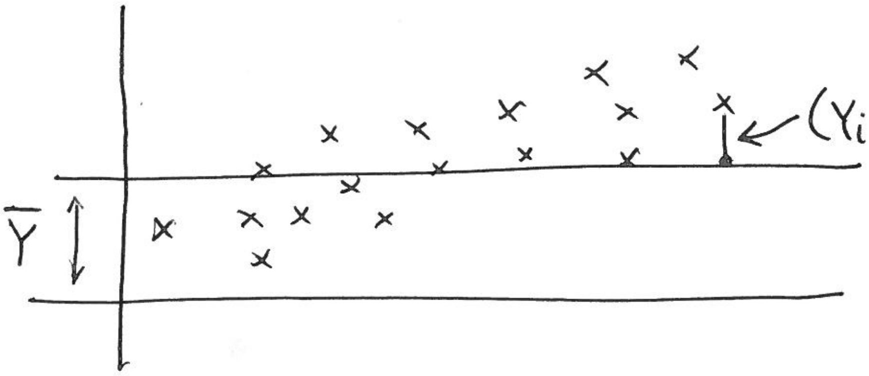
$\leftarrow s_y^2 = \frac{1}{n-1}\sum(Y_i - \bar{Y})^2$



in general $(Y_i - \bar{Y}) = (\hat{Y}_i - \bar{Y}) + (Y_i - \hat{Y}_i)$

$$\text{Total SS} = \sum_{i=1}^{n}(Y_i - \bar{Y})^2$$

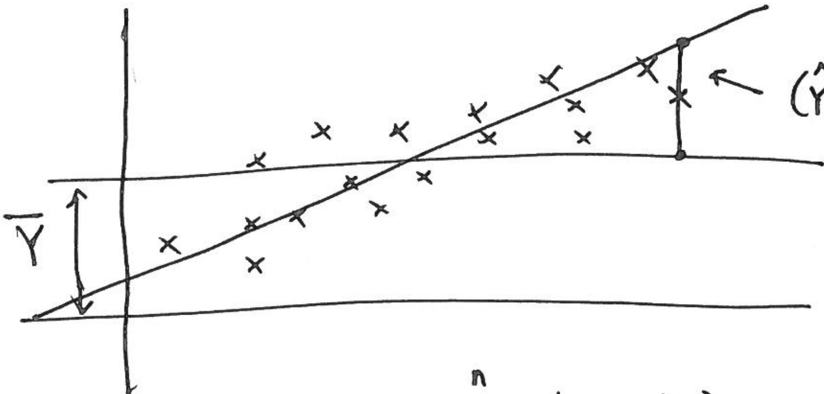
total squared distance between data & a mean (or null model $Y_i = \beta_0 + \varepsilon_i$)



$(Y_i - \bar{Y})$ ie a measure of the total variation in the observed Y data

$$\text{Regression SS} = \sum_{i=1}^{n}(\hat{Y}_i - \bar{Y})^2$$

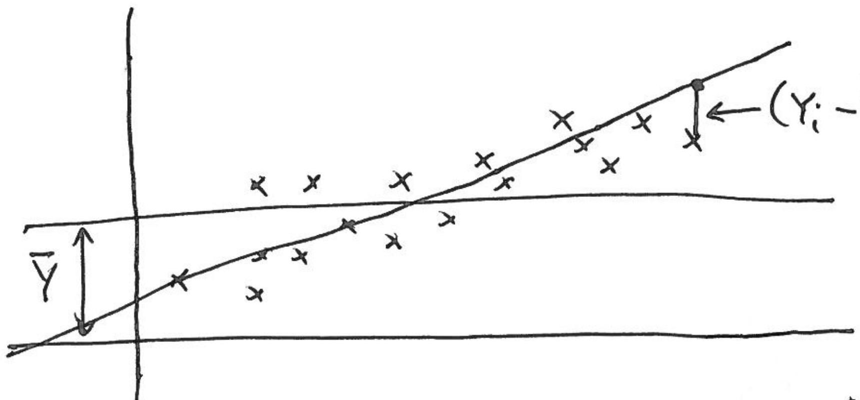
total squared distance between fitted values from model $Y_i = \beta_0 + \beta_1 x_i + \varepsilon_i$ & mean (null model)



$(\hat{Y}_i - \bar{Y})$ ie a measure of the variation "explained" by the model involving x

$$\text{Error SS} = \sum_{i=1}^{n}(Y_i - \hat{Y}_i)$$

total squared distance between data & the fitted values



$(Y_i - \hat{Y}_i)$ ie a measure of the "unexplained" variation

$$\sum(Y_i - \bar{Y})^2 = \sum(\hat{Y}_i - \bar{Y}_i)^2 + \sum(Y_i - \hat{Y}_i)^2 + \left(\begin{array}{c}\text{a cross} \\ \text{product} \\ \text{term} = 0\end{array}\right)$$

(see Q 4 (a) of Tutorial 1) ⟶

$$SS_{Total} = SS_{Regression} + SS_{Errors}$$