

-10		100	-1	1
9		<u>81</u>	<u>0</u>	<u>0</u>
-1		181	-1	1

$$\begin{bmatrix} y_1 \\ y_2 \\ \vdots \\ y_n \end{bmatrix} = \beta_0 \begin{bmatrix} 1 \\ 1 \\ \vdots \\ 1 \end{bmatrix} + \beta_1 \begin{bmatrix} x_1 \\ x_2 \\ \vdots \\ x_n \end{bmatrix} + \begin{bmatrix} \varepsilon_1 \\ \varepsilon_2 \\ \vdots \\ \varepsilon_n \end{bmatrix} = \begin{bmatrix} 1 & x_{11} \\ 1 & x_{12} \\ \vdots & \vdots \\ 1 & x_{1n} \end{bmatrix} \begin{bmatrix} \beta_0 \\ \beta_1 \end{bmatrix} + \begin{bmatrix} \varepsilon_1 \\ \varepsilon_2 \\ \vdots \\ \varepsilon_n \end{bmatrix}$$

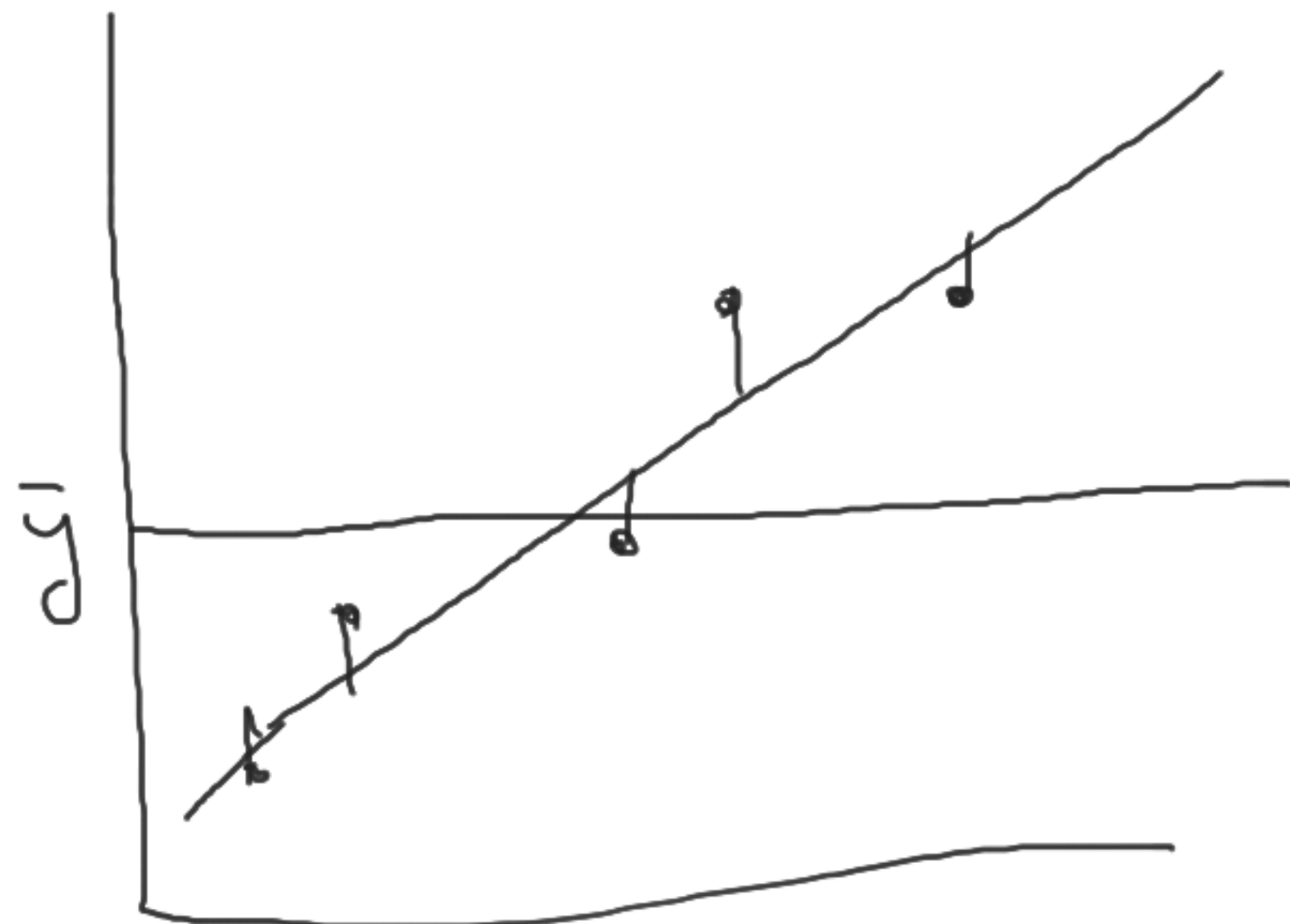
$$Y = X\beta + \varepsilon$$

$$\varepsilon = Y - X\beta$$

$$E = Y - X\hat{\beta} \quad \begin{matrix} [e_1 & e_2 & \dots & e_n] \\ 1 \times n \end{matrix} \quad \begin{matrix} \begin{bmatrix} e_1 \\ \vdots \\ e_n \end{bmatrix} \\ n \times 1 \end{matrix} \quad = 1 \times 1$$

$$E^T E = (Y - X\hat{\beta})^T (Y - X\hat{\beta})$$

$$\hat{\beta} = (X^T X)^{-1} (X^T Y) = \begin{bmatrix} \hat{\beta}_0 \\ \hat{\beta}_1 \end{bmatrix}$$



$$\sum (y_i - \bar{y})$$