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**Course:** OLS.

## Residuals

$$y_i = \beta_0 + \beta_1 x_i + e_i$$

$$\text{Repression}_i = \beta_0 + \beta_1 \text{Democracy}_i + e_i$$

...let's see how the OLS model, but in matrix form. For simplicity, we will just focus on the first three countries.

$$\begin{bmatrix} -1.6370 \\ -1.3420 \\ 0.5433 \\ \vdots \\ i_N \end{bmatrix}_{y_i} = -0.58566\beta_0 - 0.19107\beta_1 \begin{bmatrix} 0.6156 \\ 0.9518 \\ -4.9760 \\ \vdots \\ i_N \end{bmatrix}_{x_i} + \begin{bmatrix} -0.9337127 \\ -0.5744742 \\ 0.1781864 \\ \vdots \\ i_N \end{bmatrix}_{\epsilon_i}$$

Since  $\hat{y}_i = \beta_0 + \beta_1 \text{Democracy}_i$ , then it's easy to see that  $\epsilon_i = y_i - \hat{y}_i$ . Or in simple, the error ( $\epsilon_i$ ) is the difference between what I am predicting ( $\hat{y}_i$ ) and what I am observing ( $y_i$ ). It makes complete sense: it quantifies how “wrong” my model is.