Degrees of Freedom

Simple Example:

- Sum of numbers must be $\sum = 100$
- Asking 4 people to choose
- Our degrees of Freedom here is $n - 1$, cause the 4th person is dependent on the other 3 which is our degrees of freedom here $Df = 3$
- Number of independent information we have left **to estimate** something

$$DoF = \text{number of data points} - \text{number of things you've already estimated}$$

Simple Linear Regression Case :

In simple linear regression we have :

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

here we estimating both β_0, β_1.

if there is n data points, then $DoF = n - 2$ cause we fitted a line which need two data points and $n - 2$ is the independent data points that are left to vary around this fixed line

More Explanation :

- If we have $10\ \text{data points}$ and we wanted to fit a line that minimize the residuals
- We need to estimate(**use**) two points to draw the line across these data points
- The line (Intercept,slop) is fitted and calculated using **From** those 10 points
- the slop intercept is a data point and the slop is also another so $n - 2$
- Residuals that are **independent** are the ones that can vary freely

Always remember we Estimating the two Coefficients using the two **data points** and when we use these two data points they can no longer be free or vary they are "Fixed"