# Statistics

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# 1 Linear Regression (Least Squares Estimation)

## 1.1 Simple Linear Regression

- Informal definition: A statistical model that aims to describe the linear relationship between between an independent and dependent variable. The regression line can then be used to predict dependent values, $y$, as a function of the independent variables, $x$.

- Formal definition: $Y_i = \alpha + \beta x_i + \epsilon_i$

  - $Y_i$: a random variable (dependent, response variable).
  - $x_i$: an observable variable (independent, predictor, regressor, covariate variable).
  - $\alpha$: the intercept.
  - $\beta$: the slope
  - $\epsilon$: a random variable.