

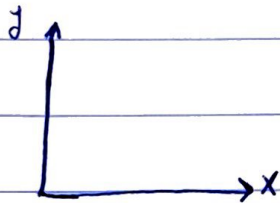
## Chapter 14: simple linear Regression.

### 14.1: Simple linear Regression Model.

Function  
Interpolation, splines, curve fitting

↳ Regression.

simple linear regression.



$x$ : input variable.

$y$ : output variable.

Given data set  $(x_1, y_1), (x_2, y_2), \dots, (x_n, y_n)$ .

#### → The simple linear regression Model.

$$Y = \beta_0 + \beta_1 X + \epsilon$$

Annotations:  $\beta_0$  is labeled "y-intercept",  $\beta_1$  is labeled "slope",  $X$  is labeled "input", and  $\epsilon$  is labeled "error".

#### → The simple linear regression equation.

$$E(Y) = \beta_0 + \beta_1 E(X) \quad \text{assuming } E(\epsilon) = 0$$

$$E(Y) = \beta_0 + \beta_1 X$$

#### → Note:

$X$  is a variable.

$Y$  is a Random variable.

$\epsilon$  is a Random variable.

#### → Estimated simple linear regression equation.

$$\hat{y} = b_0 + b_1 x$$

↑ estimate

Where

- $x$  : given value for  $X$ .
- $b_0$  : estimate for  $\beta_0$
- $b_1$  : estimate for  $\beta_1$
- $\hat{y}$  : estimate for  $Y$  when  $X = x$ .