

$x_0, y_0, x_1, y_1, \dots, (x_{n-1}, y_{n-1})$   
 related by  $y_i = a_0 + a_1 x_i + e_i$   
 linear relationship      error  
 $e_i = y_i - a_0 - a_1 x_i$

## Lecture One

Mainly just getting familiar with Python again and recapping scientific computing, then moving onto

Least squares regression:

$$S_r = \sum_{i=0}^{n-1} e_i^2 = \sum_{i=0}^{n-1} (y_i - a_0 - a_1 x_i)^2$$

error (fit) function  
↳ minimise

$$\frac{\partial S_r}{\partial a_0} = -2 \sum (y_i - a_0 - a_1 x_i) \quad (\text{slope})$$

$$\frac{\partial S_r}{\partial a_1} = -2 \sum [(y_i - a_0 - a_1 x_i) x_i] \quad (\text{intercept})$$

Set both to zero and Solve simultaneously...

$$a_0 = \bar{y} - a_1 \bar{x}, \quad a_1 = \frac{\bar{y} - a_0}{\bar{x}}$$

means