

## Home work 1:

$$f(x): y = a_0 + a_1 x$$

Case 1:  $f(x)$  is not forced to cross origin

$$a_1 = \frac{n \sum x_i y_i - \sum x_i \sum y_i}{n \sum x_i^2 - (\sum x_i)^2}$$

$$a_0 = \bar{y} - a_1 \bar{x}$$

& Based on the given dataset:

$$n = 11$$

$$\begin{aligned} \sum x_i y_i &= 0.0.2 + 0.3.0.5 + 1.1.2 + 1.7.1 + 2.1.2.5 + 2.5.2 \\ &\quad + 2.9.3 + 3.5.2.9 + 3.9.3.4 + 4.3.3.7 + 5. \\ &= 82.82 \end{aligned}$$

$$\sum x_i = 27.2$$

$$\bar{x} = 2.47$$

$$\sum x_i^2 = 94$$

$$\sum y_i = 25$$

$$\bar{y} = 2.27$$

$$\Rightarrow a_1 = \frac{11 \cdot 82.82 - 27.2 \cdot 25}{11 \cdot 94 - (27.2)^2} = \boxed{0.785}$$

$$a_0 = 2.27 - 0.785 \cdot 2.47 = \boxed{0.33105}$$

Case 0:  $f(x)$  is forced to cross origin:

$$f(x): y = a_1 x$$

$$a_1 = \frac{\sum x_i y_i}{\sum x_i^2} = \boxed{0.88}$$

$$\Rightarrow \text{Case 1: } y = 0.785x + 0.331$$

$$\text{Case 0: } y = 0.88x$$

