

$$\underline{Q} \quad x = [5, 4, 3, 2, 1]$$

$$y = [1, 2, 3, 4, 5]$$

$$\text{find } y = b_1 x_i + b_0 \quad \} \quad b_1 \text{ \& } b_0 = ?$$

$$\bar{x} = (5+4+3+2+1)/5 = 3$$

$$\bar{y} = (1+2+3+4+5)/5 = 3$$

Deviation from mean \Rightarrow

$$(x_i - \bar{x}) = [2, 1, 0, -1, -2]$$

$$(y_i - \bar{y}) = [-2, -1, 0, 1, 2]$$

Covariance $\Rightarrow \sum (x_i - \bar{x})(y_i - \bar{y}) / (n-1)$

$$\text{Cov}(x_i, y_i) = \left[\frac{2 \times (-2) + 1 \times (-1) + 0 + (-1) \times 1 + (-2) \times 2}{4} \right]$$

$$= \frac{-4 + -1 + 0 -1 -4}{4} = -2.5$$

Variance $\Rightarrow \sum (x_i - \bar{x})^2 / n-1$

$$= [4 + 1 + 0 + 1 + 4] / 4 = +2.5$$

Calculating b_1 & b_0

$$b_1 = \frac{\text{Cov}(x_i, y_i)}{\text{Var}(x_i)} = \frac{-2.5}{2.5} = -1$$

$$b_0 = \bar{y} - b_1 \bar{x} = 3 - (-1) * 3 \\ = 6$$

$$\text{final eq}^n \Rightarrow y_i = -x_i + 6$$