

C2-10

y_i	x_i	$y_i - \bar{y}$	$x_i - \bar{x}$	$(y_i - \bar{y})(x_i - \bar{x})$	$(y_i - \bar{y})^2$
7	0	3	-2.5	-7.5	9
5	1	1	-1.5	-1.5	1
5	2	1	-0.5	-0.5	1
4	3	0	0.5	0	0
2	4	-2	1.5	-3.0	4
1	5	-3	2.5	-7.5	9
SUM	24	15		-20	24

$$\text{cov}(x, y) = -20/5 = -4 \quad \text{var}(x) = 24/5 = 4.8$$

$$\hat{\beta} = \frac{\text{cov}(x, y)}{\text{var}(y)} = -\frac{4 \cdot 5}{24 \cdot 6} = -\frac{5}{6}$$

$$\hat{\alpha} = \bar{x} - \hat{\beta} \bar{y} = 2.5 + \frac{5 \cdot 4}{6} \Rightarrow \frac{5}{2} + \frac{5}{3} = \frac{25}{6}$$

$$\hat{x}_i = \hat{\alpha} - \hat{\beta} y_i = \frac{25}{6} + \frac{5}{6} y_i$$

Clearly, this is not the same line as $y_i = \frac{48}{7} - \frac{8}{7} x_i$. Since the product of their

Slopes is not 1.

$$\text{Square root of product of slopes} = \sqrt{-\frac{8}{7} \cdot \frac{5}{6}}$$

⊗ This is an imaginary number since it is the square root of a negative number.