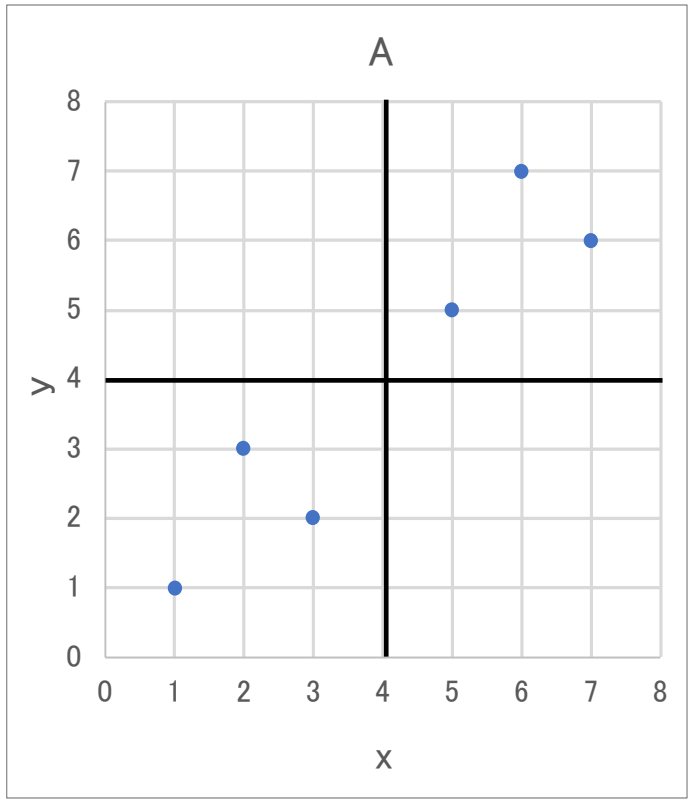
	x	A	B
	7	6	1
	6	7	6
	5	5	5
	3	2	7
	2	3	2
	1	1	3
	0		
平均値	4	4	4
標準偏差	2.16	2.16	2.16

$x_i - \bar{x}$	$y_{Ai} - \overline{y_A}$	$y_{Bi} - \overline{y_B}$
3	2	-3
2	3	2
1	1	1
-1	-2	3
-2	-1	-2
-3	-3	-1

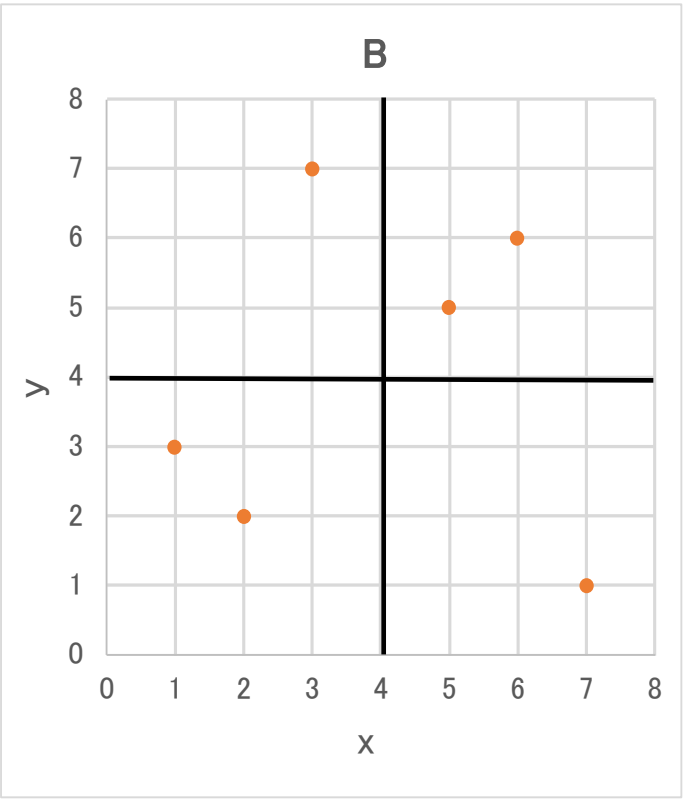
	$(x_i - \bar{x})(y_{Ai} - \overline{y_A})$	$(x_i - \bar{x})(y_{Bi} - \overline{y_B})$
	6	-9
	6	4
	1	1
	2	-3
	2	4
	9	3
合計／6	4.33	0

← 共分散

相関係数	0.93	0.00



共分散　:4.33
相関係数:0.93



共分散　:0
相関係数:0.00

$$\text{相関係数} = \frac{\text{共分散}}{(x\text{の標準偏差}) \times (y\text{の標準偏差})}$$

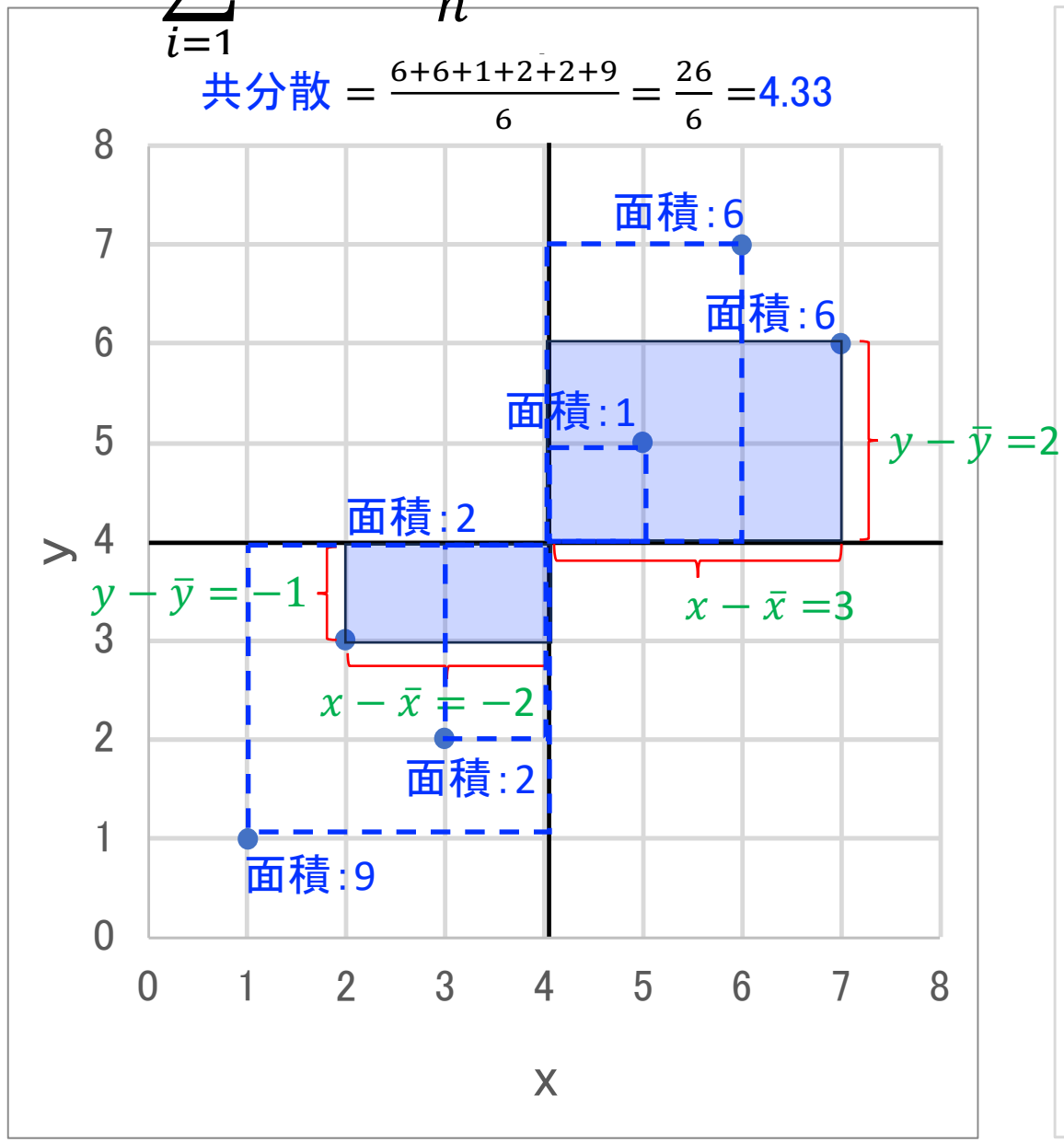
2.16　　2.16

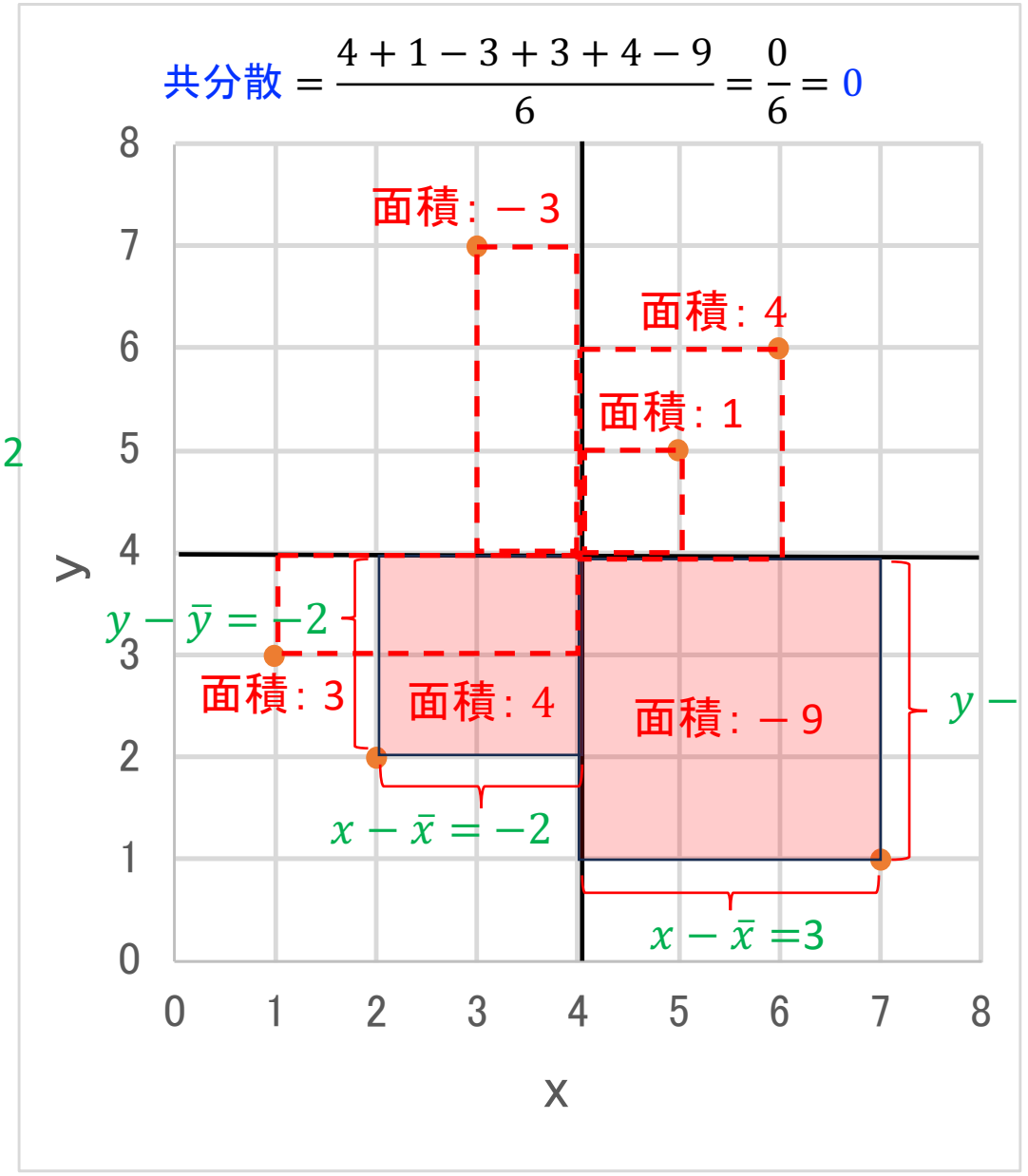
分母が同じでも共分散で
相関関係がわかる

$$\frac{\frac{1}{n}\sum_{i=1}^{n}(x_i - \bar{x})(y_i - \bar{y})}{\sqrt{\frac{1}{n}\sum_{i=1}^{n}(x_i - \bar{x})^2} \times \sqrt{\frac{1}{n}\sum_{i=1}^{n}(y_i - \bar{y})^2}} = \frac{\sum_{i=1}^{n}(x_i - \bar{x})(y_i - \bar{y})}{\sqrt{\sum_{i=1}^{n}(x_i - \bar{x})^2} \times \sqrt{\sum_{i=1}^{n}(y_i - \bar{y})^2}}$$

$$共分散 = \sum_{i=1}^{n} \frac{(x_i - \bar{x})(y_i - \bar{y})}{n}$$

面積$= (x_i - \bar{x})(y_i - \bar{y})$





$$\text{相関係数} = \frac{\text{共分散}}{(x\text{の標準偏差})\times(y\text{の標準偏差})} = \frac{1}{n}\frac{\sum_{i=1}^{n}(x_i-\bar{x})(y_i-\bar{y})}{\sigma_x\cdot\sigma_y} = \frac{1}{n}\frac{\sum_{i=1}^{n}(x_i-\bar{x})}{\sigma_x}\cdot\frac{\sum_{i=1}^{n}(y_i-\bar{y})}{\sigma_y}$$

四角形の辺の長さを標準化
→面積も標準化

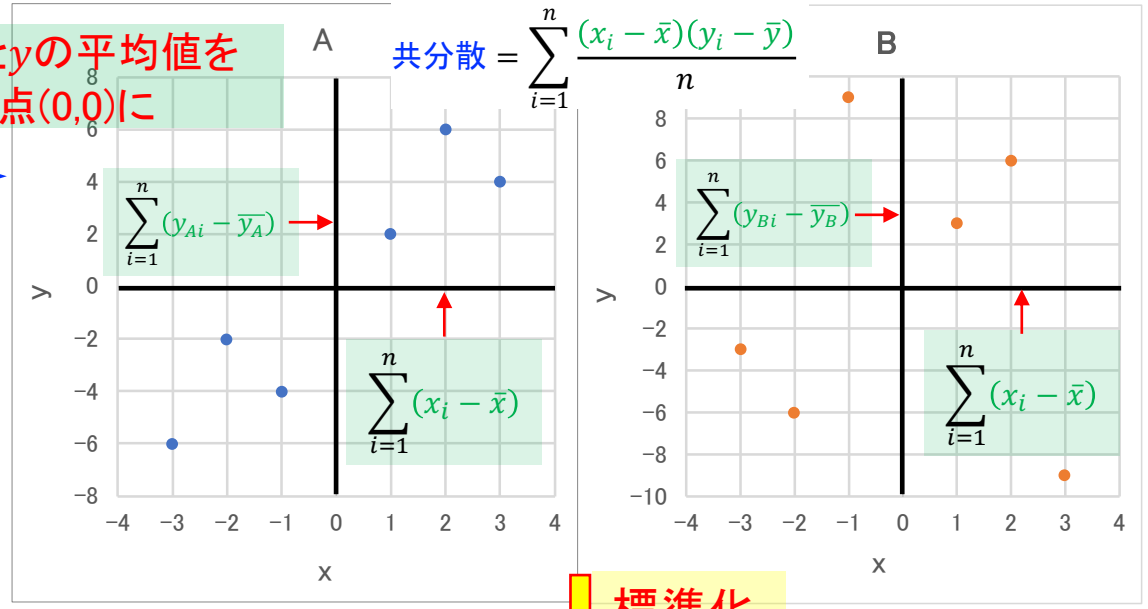
	x	A	B
	7	12	3
	6	14	18
	5	10	15
	3	4	21
	2	6	6
	1	2	9
	0		
平均値	4	8	12
標準偏差	2.16	4.32	6.48

$x_i-\bar{x}$	$y_{Ai}-\overline{y_A}$	$y_{Bi}-\overline{y_B}$
3	4	-9
2	6	6
1	2	3
-1	-4	9
-2	-2	-6
-3	-6	-3

$\frac{(x_i-\bar{x})}{\sigma_x}$	$\frac{(y_{Ai}-\overline{y_A})}{\sigma_{y_A}}$	$\frac{(y_{Bi}-\overline{y_B})}{\sigma_{y_B}}$
1.39	0.93	-1.39
0.93	1.39	0.93
0.46	0.46	0.46
-0.46	-0.93	1.39
-0.93	-0.46	-0.93
-1.39	-1.39	-0.46

xとyの平均値を原点(0,0)に

共分散 $= \sum_{i=1}^{n}\frac{(x_i-\bar{x})(y_i-\bar{y})}{n}$



標準化