

Aufgabe 1

x	$x - \bar{x}$	$(x - \bar{x})^2$	y	$y - \bar{y}$	$(y - \bar{y})^2$	$(x - \bar{x})(y - \bar{y})$
1	-2	4	5	1	1	-2
6	3	9	6	2	4	6
2	-1	1	1	-3	9	3
9	0	14	12	0	14	7

$$a = \frac{7}{14} = 0.5$$

$$b = \bar{y} - a \cdot \bar{x} = 2.5$$

$$r_{xy} = \frac{7}{\sqrt{196}} = 0.5$$

Aufgabe 2

x	$x - \bar{x}$	$(x - \bar{x})^2$	y	$y - \bar{y}$	$(y - \bar{y})^2$	$(x - \bar{x})(y - \bar{y})$
5	-1	1	9	2	4	-2
6	0	0	7	0	0	0
7	1	1	5	-2	4	-2
18	0	2	21	0	8	-4

$$a = \frac{-4}{2} = -2$$

$$b = \bar{y} - a \cdot \bar{x} = 19$$

$$r_{xy} = \frac{-4}{\sqrt{16}} = -1.0$$

Aufgabe 3

x	$x - \bar{x}$	$(x - \bar{x})^2$	y	$y - \bar{y}$	$(y - \bar{y})^2$	$(x - \bar{x})(y - \bar{y})$
3	-2	4	1	-4	16	8
9	4	16	5	0	0	0
3	-2	4	9	4	16	-8
15	0	24	15	0	32	0

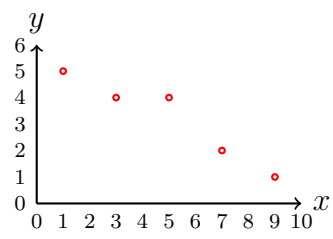
$$a = \frac{0}{24} = 0$$

$$b = \bar{y} - a \cdot \bar{x} = 5$$

$$r_{xy} = \frac{0}{\sqrt{768}} = 0.0$$

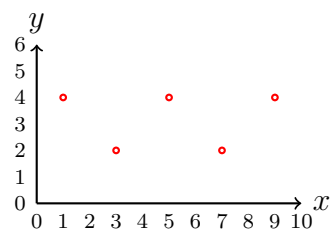
Aufgabe 4 (a)

$$r_{xy} = -0.95$$



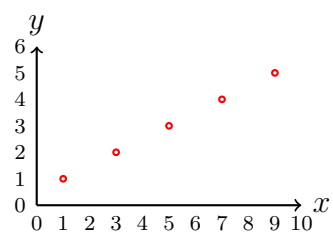
Aufgabe 4 (b)

$$r_{xy} = 0$$



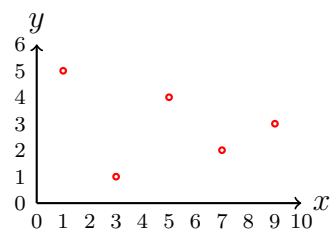
Aufgabe 4 (c)

$$r_{xy} = 1$$



Aufgabe 4 (d)

$$r_{xy} = -0.29$$



Aufgabe 5

$$f(x) = x^2 - x + 2$$

x	$\hat{y} = f(x)$	y	$\hat{y} - y$	$(\hat{y} - y)^2$
-1	4	5	-1	1
0	2	2	0	0
1	2	0	2	4
2	4	2	2	4
				9

$$g(x) = x^2 + x - 3$$

x	$\hat{y} = g(x)$	y	$\hat{y} - y$	$(\hat{y} - y)^2$
-1	-3	5	-8	64
0	-3	2	-5	25
1	-1	0	-1	1
2	3	2	1	1
				91

$$h(x) = x^2 - 2x + 1$$

x	$\hat{y} = h(x)$	y	$\hat{y} - y$	$(\hat{y} - y)^2$
-1	4	5	-1	1
0	1	2	-1	1
1	0	0	0	0
2	1	2	-1	1
				3

Die Funktion h approximiert die Daten mit der Summe der quadrierten Abweichungen von 3 am besten.

Aufgabe 6

$$f(x, y) = \frac{1}{2}x^2 + \frac{1}{2}y^2 + 5xy - 4x + 4y - 1$$

$$\frac{\partial f(x, y)}{\partial x} = x + 5y - 4 = 0$$

$$\frac{\partial f(x, y)}{\partial y} = y + 5x + 4 = 0$$

$$x = -1, y = 1$$

$$z = f(-1, 1) = \dots = 3$$

$$P(-1, 1, 3)$$