

## Aufgabe 1

(1)

a)

$$\bar{x} = \frac{2+3+4+5+6}{5} = 4 \quad \bar{y} = \frac{4+5+6+7+8}{5} = 6$$

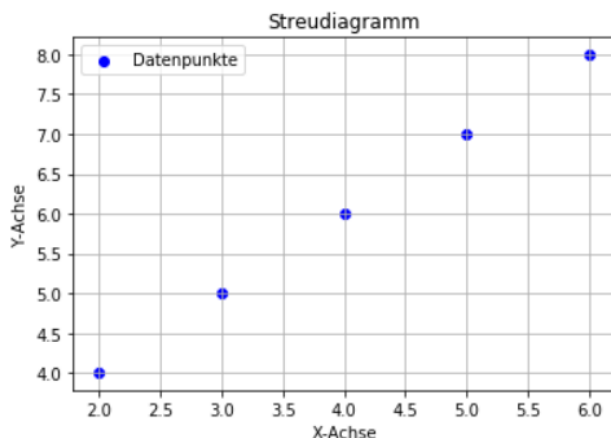
$$\begin{array}{ll} x - \bar{x} = 2 - 4 = -2 & y - \bar{y} = 4 - 6 = -2 \\ x - \bar{x} = 3 - 4 = -1 & y - \bar{y} = 5 - 6 = -1 \\ x - \bar{x} = 4 - 4 = 0 & y - \bar{y} = 6 - 6 = 0 \\ x - \bar{x} = 5 - 4 = 1 & y - \bar{y} = 7 - 6 = 1 \\ x - \bar{x} = 6 - 4 = 2 & y - \bar{y} = 8 - 6 = 2 \end{array}$$

$$\sum (x - \bar{x})^2 = (-2)^2 + (-1)^2 + (0)^2 + (1)^2 + (2)^2 = 10 \quad \sum (y - \bar{y})^2 = (-2)^2 + (-1)^2 + (0)^2 + (1)^2 + (2)^2 = 10$$

$$r = \frac{(-2)*(-2) + (-1)*(-1) + (0)*(0) + (1)*(1) + (2)*(2)}{\sqrt{10*10}} = 1$$

Der Pearson-Korrelationskoeffizient r beträgt 1 in diesem Beispiel

(b)



(2)

(a)

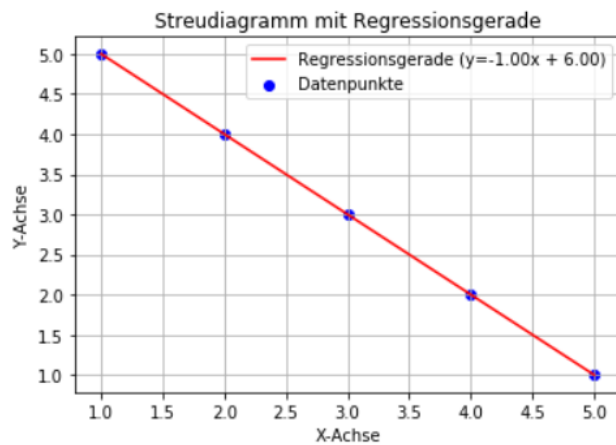
$$\bar{x} = \frac{1+2+3+4+5}{5} = 3 \quad \bar{y} = \frac{5+4+3+2+1}{5} = 3$$

$$\begin{array}{ll} 1 - 3 = -2 & 5 - 3 = 2 \\ 2 - 3 = -1 & 4 - 3 = 1 \\ 3 - 3 = 0 & 3 - 3 = 0 \\ 4 - 3 = 1 & 2 - 3 = -1 \\ 5 - 3 = 2 & 1 - 3 = -2 \end{array}$$

$$\sum (x - \bar{x})^2 = (-2)^2 + (-1)^2 + (0)^2 + (1)^2 + (2)^2 = 10 \quad \sum (y - \bar{y})^2 = (2)^2 + (1)^2 + (0)^2 + (-1)^2 + (-2)^2 = 10$$

$$r = \frac{(-2)(2) + (-1)(1) + (0)(0) + (1)(-1) + (2)(-2)}{\sqrt{10 \cdot 10}} = \frac{-10}{10} = -1$$

(b)



(3)

a)

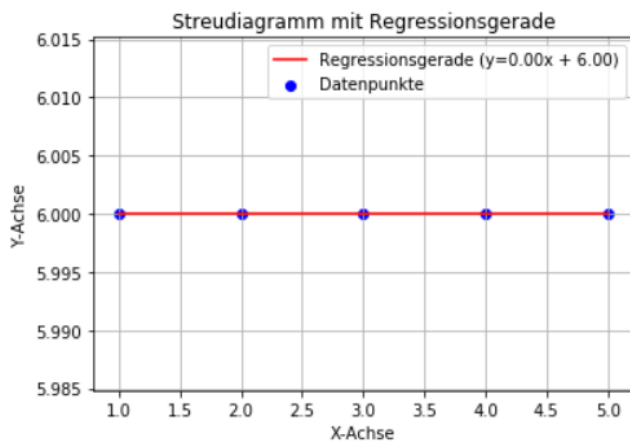
$$\bar{x} = \frac{1+2+3+4+5}{5} = 3 \quad \bar{y} = \frac{6+6+6+6+6}{5} = 6$$

$1-3=-2$	$6-6=0$
$2-3=-1$	$6-6=0$
$3-3=0$	$6-6=0$
$4-3=1$	$6-6=0$
$5-3=2$	$6-6=0$

$$\sum (x - \bar{x})^2 = (-2)^2 + (-1)^2 + (0)^2 + (1)^2 + (2)^2 = 10 \quad \sum (y - \bar{y})^2 = (0)^2 + (0)^2 + (0)^2 + (0)^2 + (0)^2 = 0$$

$$r = \frac{(-2)(0) + (-1)(0) + (0)(0) + (1)(0) + (2)(0)}{\sqrt{10 \cdot 0}} = \dots \text{Division by 0}$$

b)



(4)

a)

$$\bar{x} = \frac{1+2+3+4+5}{5} = 3 \quad \bar{y} = \frac{2+4+6+8+10}{5} = 6$$

$$1-3=-2$$

$$2-6=-4$$

$$2-3=-1$$

$$4-6=-2$$

$$3-3=0$$

$$6-6=0$$

$$4-3=1$$

$$8-6=2$$

$$5-3=2$$

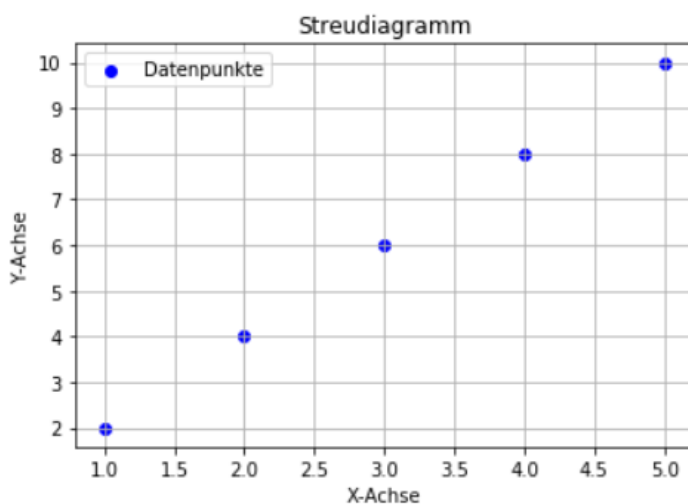
$$10-6=4$$

$$\sum (x - \bar{x})^2 = (-2)^2 + (-1)^2 + (0)^2 + (1)^2 + (2)^2 = 10$$

$$\sum (y - \bar{y})^2 = (-4)^2 + (-2)^2 + (0)^2 + (2)^2 + (4)^2 = 40$$

$$r = \frac{(-2)(-4) + (-1)(-2) + (0)(0) + (1)(2) + (2)(4)}{\sqrt{10 \cdot 40}} = \frac{20}{20} = 1$$

b)



## Aufgabe 2

(1)

a)

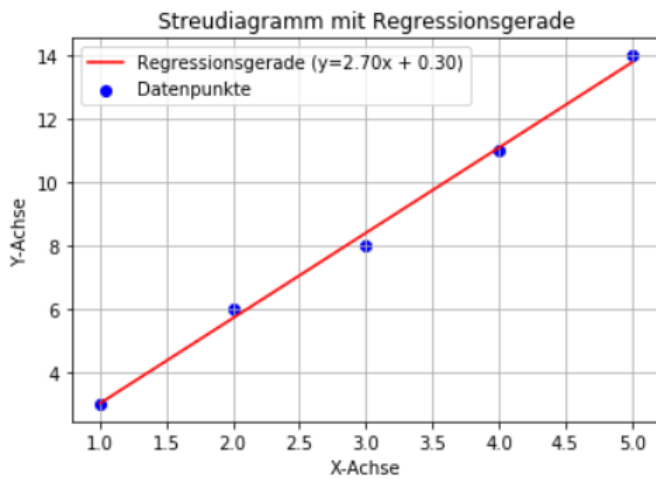
$$\bar{x} = \frac{1+2+3+4+5}{5} = 3 \quad \bar{y} = \frac{3+6+8+11+14}{5} = 8,4$$

$$m = \frac{(1-3)(3-8,4) + (2-3)(6-8,4) + (3-3)(8-8,4) + (4-3)(11-8,4) + (5-3)(14-8,4)}{(1-3)^2 + (2-3)^2 + (3-3)^2 + (4-3)^2 + (5-3)^2} = 2,7$$

$$b = 8,4 - 2,7 \cdot 3 = 0,3$$

$$y = 2,7x + 0,3$$

b)



(2)

a)

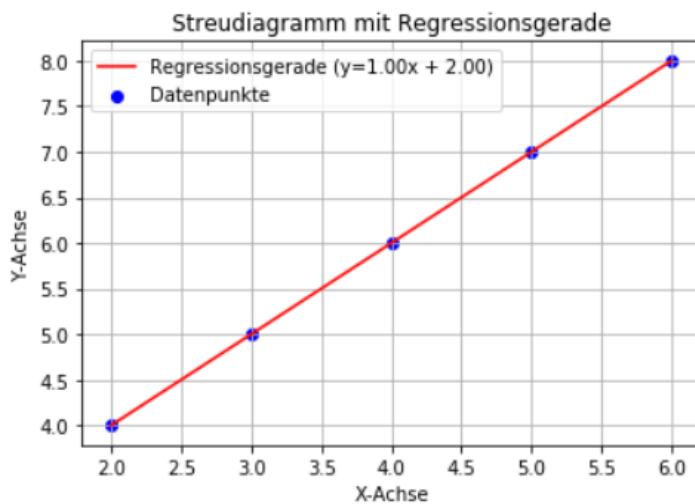
$$\bar{x} = \frac{2+3+4+5+6}{5} = 4 \quad \bar{y} = \frac{4+5+6+7+8}{5} = 6$$

$$m = \frac{(-2)(-2) + (-1)(-1) + (0)(0) + (1)(1) + (2)(2)}{(-2)^2 + (-1)^2 + (0)^2 + (1)^2 + (2)^2} = \frac{10}{10} = 1$$

$$b = \bar{y} - m\bar{x} = 6 - 1 \cdot 4 = 2$$

$$y = 1x + 2$$

b)



(3)

a)

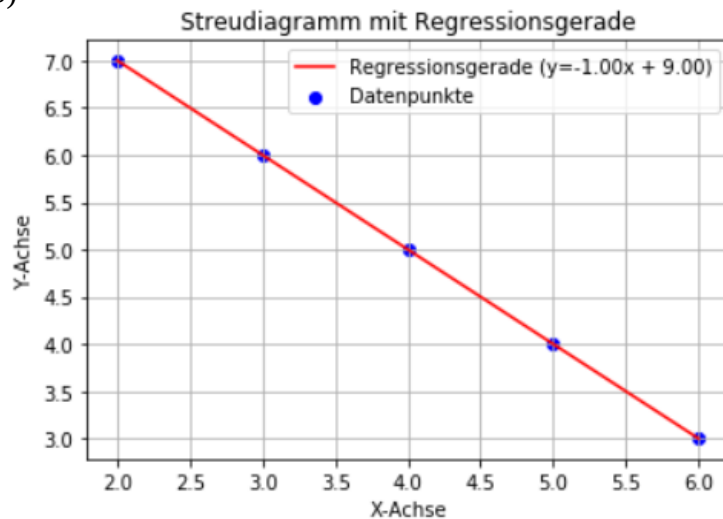
$$\bar{x} = \frac{2+3+4+5+6}{5} = 4 \quad \bar{y} = \frac{7+6+5+4+3}{5} = 5$$

$$m = \frac{(-2)(2) + (-1)(1) + (0)(0) + (1)(-1) + (2)(-2)}{(-2)^2 + (-1)^2 + (0)^2 + (1)^2 + (2)^2} = -1$$

$$b = \bar{y} - m\bar{x} = 5 - (-1)4 = 9$$

$$y = -x + 9$$

b)



(4)

a)

$$\bar{x} = \frac{1+2+3+4+5}{5} = 3 \quad \bar{x} = \frac{2+4+6+8+10}{5} = 6$$

$$m = \frac{(-2)(-4) + (-1)(-2) + (0)(0) + (1)(2) + (2)(4)}{(-2)^2 + (-1)^2 + (0)^2 + (1)^2 + (2)^2} = \frac{20}{10} = 2$$

$$b = \bar{y} - m\bar{x} = 6 - 2 \cdot 3 = 0$$

$$y = 2x + 0$$

b)

