

Aufgabe 1 (Varianz)

1.

(2,4,4,4,5)

Arithmetisches Mittel berechnen

$$\begin{aligned}\bar{x} &= \sum_{i=1}^5 x \\ &= \frac{1}{5} (2+4+4+4+5) \\ &= \frac{1}{5} * 19 \\ &= \frac{19}{5} = 3,8\end{aligned}$$

Varianz berechnen

$$\begin{aligned}s^2 &= \frac{1}{5} \sum_{i=1}^5 (x_i - 3,8)^2 \\ s^2 &= \frac{1}{5} ((2-3,8)^2 + (4-3,8)^2 + (4-3,8)^2 + (4-3,8)^2 + (5-3,8)^2) \\ s^2 &= \frac{1}{5} (3,24 + 0,04 + 0,04 + 0,04 + 1,44) \\ s^2 &= \frac{1}{5} * 4,8 \\ s^2 &= 0,96\end{aligned}$$

2.

(3,4,5,3,2)

$$\bar{x} = \frac{1}{5} (3+4+5+3+2) = \frac{17}{5} = 3,4$$

$$\begin{aligned}s^2 &= \frac{1}{5} \sum_{i=1}^5 (x_i - 3,4)^2 \\ s^2 &= \frac{1}{5} ((3-3,4)^2 + (4-3,4)^2 + (5-3,4)^2 + (3-3,4)^2 + (2-3,4)^2) \\ s^2 &= \frac{1}{5} (0,16 + 0,36 + 2,56 + 0,16 + 1,96) \\ s^2 &= \frac{1}{5} * 5,2 \\ s^2 &= 1,04\end{aligned}$$

3.

(120,130,110,125,140)

$$\bar{x} = \frac{1}{5} (120 + 130 + 110 + 125 + 140) = \frac{625}{5} = 125$$

$$s^2 = \frac{1}{5} \sum_{i=1}^5 (x_i - 125)^2$$

$$s^2 = \frac{1}{5} ((120 - 125)^2 + (130 - 125)^2 + (110 - 125)^2 + (125 - 125)^2 + (140 - 125)^2)$$

$$s^2 = \frac{1}{5} * 500$$

$$s^2 = 100$$

4.

(12,1; 11,9; 12,0; 12,2; 11,8)

$$\bar{x} = \frac{1}{5} (12,1 + 11,9 + 12,0 + 12,2 + 11,8) = \frac{60}{5} = 12$$

$$s^2 = \frac{1}{5} \sum_{i=1}^5 (x_i - 12)^2$$

$$s^2 = \frac{1}{5} ((12,1 - 12)^2 + (11,9 - 12)^2 + (12,0 - 12)^2 + (12,2 - 12)^2 + (11,8 - 12)^2)$$

$$s^2 = \frac{1}{5} * 0,1$$

$$s^2 = 0,025$$

Aufgabe 2 (Standardabweichung)

$$1. \sqrt{\frac{19}{5}} = 3,8$$

$$2. \sqrt{\frac{4,8}{5}} = 0,96$$

$$3. \sqrt{\frac{500}{5}} = 10$$

$$4. \sqrt{\frac{0,1}{5}} = 0,02$$

Aufgabe 3 (Spannweite)

$$R = x_{\max} - x_{\min}$$

$$1. R = 5 - 2 = 3$$

$$2. R = 5 - 2 = 3$$

$$3. R = 140 - 110 = 30$$

$$4. R = 12,2 - 11,8 = 0,4$$

Aufgabe 4 (Skalenniveaus und Statistische Maße)

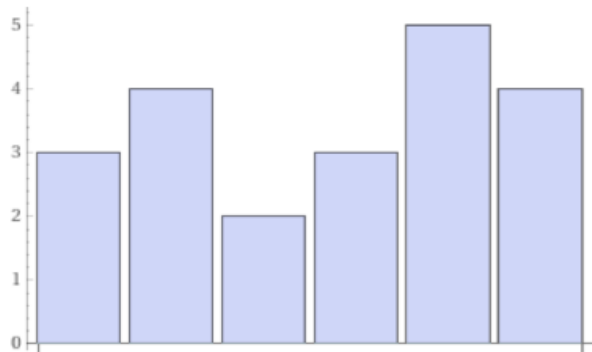
1. Modi sind : Ford und BMW

2. (3,4,2,3,5,4) → sortieren → (2,3,3,4,4,5)

$$\tilde{x} = \frac{1}{2} (x_{\frac{6}{2}} + x_{\frac{6}{2}+1})$$

$$\tilde{x} = \frac{1}{2} (x_3 + x_{3+1}) = \frac{1}{2} (x_3 + x_4) = \frac{1}{2} (3 + 4) = 3,5$$

Balkendiagramm:



3. (21,22,20,21,23,21) sortiert → (20,21,21,21,22,23)

$$\bar{x} = \frac{1}{6} (21 + 22 + 20 + 21 + 23 + 21) = 21, \tilde{3}$$

$$\tilde{x} = \frac{1}{2} (x_{\frac{6}{2}} + x_{\frac{6}{2}+1}) = \frac{1}{2} (21 + 21) = \frac{1}{2} * 42 = 21$$

$$s^2 = \frac{1}{6} ((21 - 21,3)^2 + (22 - 21,3)^2 + (20 - 21,3)^2 + (21 - 21,3)^2 + (23 - 21,3)^2 + (21 - 21,3)^2)$$

$$s^2 = \frac{1}{6} (0,09 + 0,49 + 1,69 + 0,09 + 2,89 + 0,09)$$

$$s^2 = 0,89$$

$$s \approx 0,943$$

$$R = 23 - 20 = 3$$

4. (4000,4500,4200,4800,4500) sortiert → (4000,4200,4500,4500,4800)

$$\bar{x} = \frac{1}{5} (4000 + 4200 + 4500 + 4500 + 4800) = 4400$$

$$\tilde{x} = x_{\frac{5+1}{2}} = x_3 = 4500$$

$$s^2 = \frac{1}{5} ((4000 - 4400)^2 + (4200 - 4400)^2 + (4500 - 4400)^2 + (4500 - 4400)^2 + (4800 - 4400)^2)$$

$$s^2 = \frac{1}{5} (160000 + 40000 + 10000 + 10000 + 160000) = 76000$$

$$s \approx 275,681$$

$$R = 4800 - 4000 = 800$$

Diagramm:

