

### 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*

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

2.

(3,4,5,3,2)

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

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

3.

(120,130,110,125,140)

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

$$\begin{aligned}s^2 &= \frac{1}{4} \sum_{i=1}^5 (x_i - 125)^2 \\ &= \frac{1}{4} ((120-125)^2 + (130-125)^2 + (110-125)^2 + (125-125)^2 + (140-125)^2) \\ &= \frac{1}{4} * 500 \\ &= 125\end{aligned}$$

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

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

### 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)

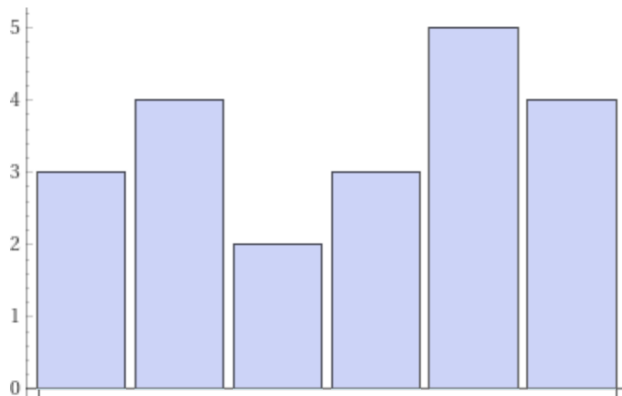
1. Modi sind: Ford und BMW

2.  $(3, 4, 2, 3, 5, 4) \rightarrow \text{sortieren} \rightarrow (2, 3, 3, 4, 4, 5)$

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

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

Balkendiagramm:



3.  $(21, 22, 20, 21, 23, 21) \text{ sortiert} \rightarrow (20, 21, 21, 21, 22, 23)$

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

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

$$s^2 = \frac{1}{5} ((21 - 21,3)^2 + (22 - 21,3)^2 + (20 - 21,3)^2 + (21 - 21,3)^2 + (23 - 21,3)^2 + (21 - 21,3)^2)$$

$$s^2 = 0,09 + 0,49 + 1,69 + 0,09 + 2,89 + 0,09$$

$$s^2 = 1,068$$

$$s = 1,033$$

$$R = 23 - 20 = 3$$

4.  $(4000, 4500, 4200, 4800, 4500) \text{ sortiert} \rightarrow (4000, 4200, 4500, 4500, 4800)$

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

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

$$s^2 = \frac{1}{4} ((4000 - 4400)^2 + (4200 - 4400)^2 + (4500 - 4400)^2 + (4500 - 4400)^2 + (4800 - 4400)^2)$$

$$s^2 = \frac{1}{4} (160000 + 40000 + 10000 + 10000 + 160000) = 95000$$

$$s \approx 308,22$$

$$R = 4800 - 4000 = 800$$

Diagramm:

