

Aufgabe 2 a)  
minimiere

$$\chi^2 = \sum_{i=1}^n \frac{(y_i - f(x_i))^2}{\sigma_y^2} = \sum_{i=1}^n \frac{(y_i - ax_i + b)^2}{\sigma_y^2}$$

$$\Rightarrow \frac{d}{da} \sum_{i=1}^n \frac{(y_i - ax_i + b)^2}{\sigma_y^2} = \sum_{i=1}^n \frac{d}{da} \frac{(y_i - ax_i + b)^2}{\sigma_y^2}$$

$$= \sum_{i=1}^n \frac{d}{da} \frac{y_i^2 + a^2 x_i^2 + b^2 - 2y_i a x_i + 2b y_i - 2a b x_i}{\sigma_y^2}$$

$$= \sum_{i=1}^n \frac{d}{da} \frac{a^2 x_i^2 - 2a x_i y_i - 2a b x_i + y_i^2 + 2b y_i + b^2}{\sigma_y^2}$$

$$= \sum_{i=1}^n \frac{2a x_i^2 - 2x_i y_i - 2b x_i}{\sigma_y^2} \stackrel{!}{=} 0$$

$$\Rightarrow \cancel{\sum_{i=1}^n \frac{a x_i^2}{\sigma_y^2}} = \cancel{\sum_{i=1}^n \frac{x_i y_i - b x_i}{\sigma_y^2}}$$

$$\Rightarrow \sum_{i=1}^n a x_i = \sum_{i=1}^n y_i - b$$

$$\Rightarrow a = \frac{\sum_{i=1}^n y_i - b}{\sum_{i=1}^n x_i}$$