Formelsammlung 2 Mathe

Arithmetisches Mittel

$$\bar{x} = \frac{1}{n}\sum_{i=1}^{n} x_i \qquad \bar{x} = \frac{1}{n}\sum_{i=1}^{m} x_i n_{i\bullet}$$

$$\bar{y} = \frac{1}{n}\sum_{i=1}^{n} y_i \qquad \bar{y} = \frac{1}{n}\sum_{j=1}^{l} y_j n_{\bullet j}$$

Varianz

$$\bar{s}^2 = \frac{1}{n}\sum_{j=1}^{n}(x_j - \bar{x})^2 = \frac{1}{n}\sum_{j=1}^{n} x_j{}^2 - \bar{x}^2$$

$$s_x{}^2 = \frac{1}{n}\sum_{i=1}^{m}(x_i - \bar{x})^2 n_{i\bullet} = \frac{1}{n}\sum_{i=1}^{m} x_i{}^2 n_{i\bullet} - \bar{x}^2$$

$$s_y{}^2 = \frac{1}{n}\sum_{j=1}^{l}(y_j - \bar{y})^2 n_{\bullet j} = \frac{1}{n}\sum_{j=1}^{l} y_j{}^2 n_{\bullet j} - \bar{y}^2$$

Standardabweichung

$$\bar{s} = \sqrt{\bar{s}^2}$$

Kovarianz

$$\mathrm{COV}(X,Y) = \frac{1}{n}\sum_{i=1}^{m}\sum_{j=1}^{l}(x_i - \bar{x})(y_j - \bar{y})\cdot n_{ij} = \frac{1}{n}\sum_{i=1}^{m}\sum_{j=1}^{l} x_i y_j n_{ij} - \bar{x}\cdot\bar{y}$$

$$\mathrm{COV}(X,Y) = \frac{1}{n}\sum_{i=1}^{n}(x_i - \bar{x})(y_i - \bar{y}) = \frac{1}{n}\sum_{i=1}^{n} x_i y_i - \bar{x}\cdot\bar{y}$$

Lineare Regressionsfunktion

Gleichung der 1. Regressionsgeraden:

$$y = a + bx$$

mit $a = \bar{y} - b\bar{x}$ und $b = \dfrac{\mathrm{COV}(X,Y)}{s_x{}^2} = \dfrac{\sum_{i=1}^{n}(x_i - \bar{x})(y_i - \bar{y})}{\sum_{i=1}^{n}(x_i - \bar{x})^2} = \dfrac{\frac{1}{n}\sum_{i=1}^{n} x_i y_i - \bar{x}\cdot\bar{y}}{\frac{1}{n}\sum_{i=1}^{n} x_i{}^2 - \bar{x}^2}$

Gleichung der 2. Regressionsgeraden:

$$x = a' + b'y$$

mit $a' = \bar{x} - b'\bar{y}$ und $b' = \dfrac{\mathrm{COV}(X,Y)}{s_y{}^2} = \dfrac{\sum_{i=1}^{n}(x_i - \bar{x})(y_i - \bar{y})}{\sum_{i=1}^{n}(y_i - \bar{y})^2} = \dfrac{\frac{1}{n}\sum_{i=1}^{n} x_i y_i - \bar{x}\cdot\bar{y}}{\frac{1}{n}\sum_{i=1}^{n} y_i{}^2 - \bar{y}^2}$