

Letzte 😊😞 Vorlesung Mathe 2 2.7.14

Nochmals Überblick

Integralrechnung

Beschreibende Statistik

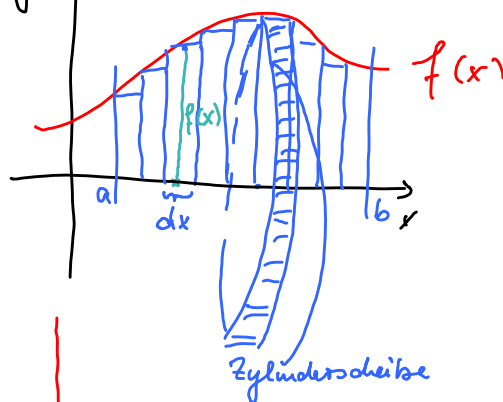
Wahrscheinlichkeitsrechnung

Komplexe Zahlen

Differentialgleichungen

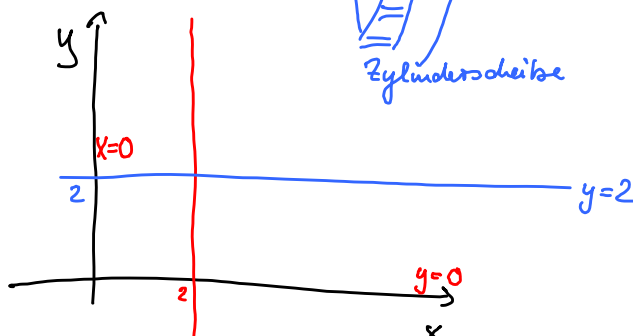
Mehrdimensionale Analysis
(Graphentheorie)

Integralrechnung



$$\int_a^b f(x) \cdot dx$$

Merke



$$\int \pi [f(x)]^2 \cdot dx$$

$$= \pi \int [f(x)]^2 \cdot dx$$

Volumen bei Rotation
um die x-Achse

1. Bp.

$$\int \frac{e^{\sqrt{x}}}{\sqrt{x}} dx$$

$$u = \sqrt{x} \\ = x^{\frac{1}{2}}$$

$$u' = \frac{du}{dx} = \frac{1}{2\sqrt{x}}$$

$$du = \frac{1}{2\sqrt{x}} dx$$

Substitution

$$= 2 \int e^u du$$

$$dx = du \cdot 2\sqrt{x}$$

$$= 2e^u \underset{\text{Rückes.}}{=} 2 \cdot e^{\sqrt{x}} + C, C \in \mathbb{R}$$

2. Bp. $\int_0^{\pi/4} 4t \cos(2t) dt$

$$\int u'v dt = u \cdot v - \int uv' dt$$

$$v = 4t$$

$$v' = 4$$

$$u' = \cos(2t)$$

$$u = \frac{1}{2} \sin(2t)$$

$$\int \dots = \frac{1}{2} \sin(2t) \cdot 4t - \int \frac{1}{2} \sin(2t) \cdot 4 dt$$

$$= 2 \sin(2t) - 2 \underbrace{\int \sin(2t) dt}_{-\frac{1}{2} \cos(2t)}$$

$$= 2 \sin(2t) + \cos(2t)$$

$$\left[2 \sin(2t) \cdot t + \cos(2t) \right]_0^{\pi/4} = F(b) - F(a) = \frac{\pi}{4} \cdot 2 + 0 - 0 - 1 = \frac{\pi}{2} - 1$$

Bp. Kombinatorik

Möglichkeiten für 6 Richtige im Lotto: $\binom{49}{6}$

$$P(6 \text{ Richtige}) = \frac{1}{\binom{49}{6}} = \frac{1}{13983816} = \underline{7,1511 \cdot 10^{-8}}$$

$$P(\text{af f e}) = \frac{1}{50^4} = \underline{1,6 \cdot 10^{-7}}$$

$\frac{1}{50} \cdot \frac{1}{50} \cdot \frac{1}{50} \cdot \frac{1}{50}$

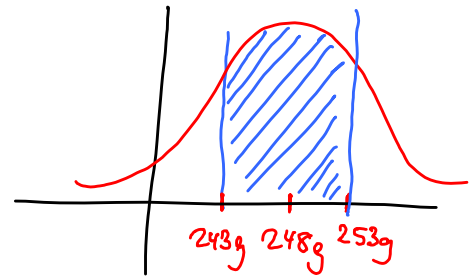
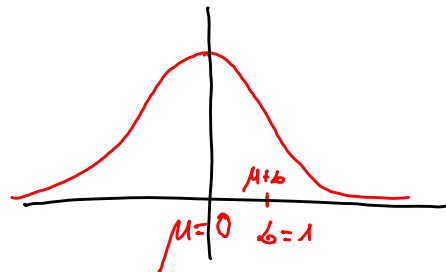
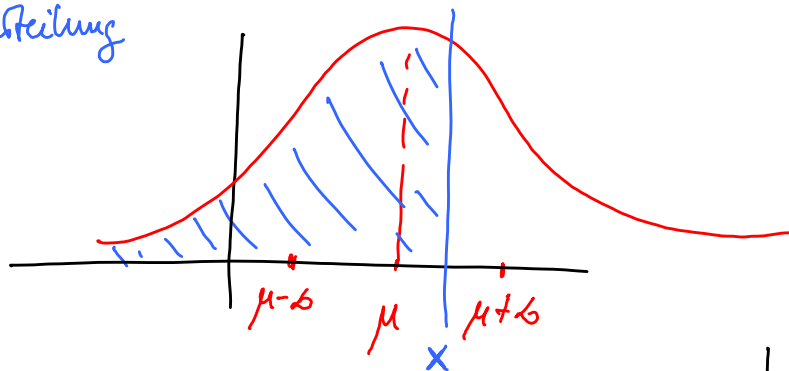
Bp.: $n = 5$
 $p = 0.8$
 $q = 0.2$
 $x = 4$

X Zua beschreibt die Anzahl der Erfolge

$$\begin{aligned} P(X=4) &= \binom{5}{4} \cdot 0.8^4 \cdot 0.2^{5-4} \\ &= 5 \cdot 0.4096 \cdot 0.2 \\ &= 0.4096 \\ &\approx 40.96\% \end{aligned}$$

$$\binom{5}{4} = \frac{5!}{4!(5-4)!}$$

Normalverteilung



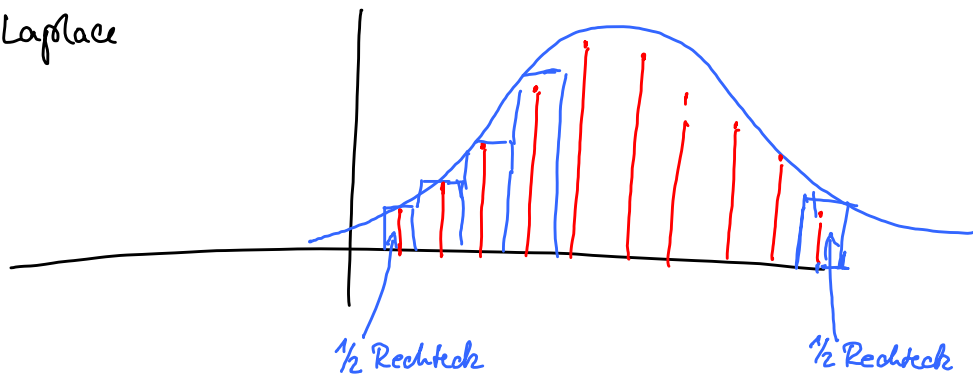
Bp. Normalverteilung

$$\begin{aligned} \mu &= 248 \text{ g} \\ \sigma &= 4 \text{ g} \end{aligned}$$

$$\begin{aligned} P(243 \leq X \leq 253) &= \Phi\left(\underbrace{\frac{253 - 248}{4}}_{\text{ausrechnen}}\right) - \Phi\left(\underbrace{\frac{243 - 248}{4}}_{\text{ausrechnen}}\right) \\ &= \Phi\left(\frac{253 - 248}{4}\right) - \Phi\left(\frac{243 - 248}{4}\right) \\ &= \Phi\left(\frac{253 - 248}{4}\right) - (1 - \Phi(\dots)) \end{aligned}$$

Werte der Tabelle entnehmen

De Moivre-Laplace



$$B_p: P(X \leq 10) = \sum_{x=0}^{10} \binom{500}{x} 0.03^x \cdot 0.97^{500-x}$$

$$GWS: \mu = n \cdot p = 500 \cdot 0.03 = 15$$

$$\sigma = \sqrt{n \cdot p \cdot (1-p)} \approx 3.8$$

$$P(0 \leq X \leq 10) = \Phi\left(\frac{10 - 15 + 0.5}{3.8}\right) - \Phi\left(\frac{0 - 15 - 0.5}{3.8}\right)$$

⋮
⋮

Tafelre

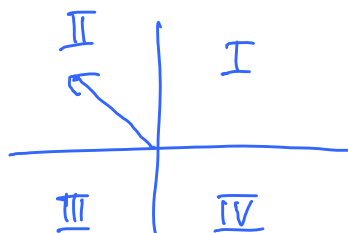
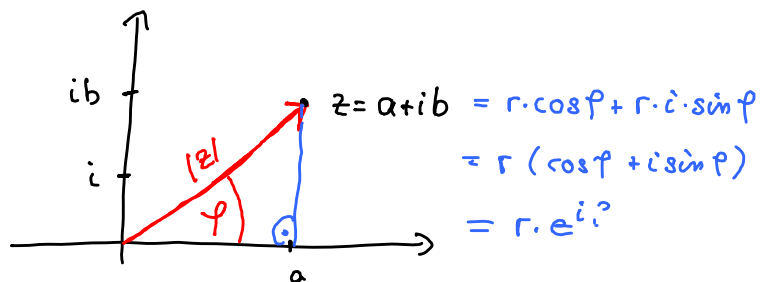
0,119

$\approx 11.9\%$

Die komplexen Zahlen $\mathbb{C}$

$$z = a + ib$$

Re z Im z



DGL

$$y' = \frac{dy}{dx}$$

"Schlüssel" zur Lösung