

**Potenzregeln 2^{3x}**

$$a^m \cdot a^n = a^{m+n} \quad \left| \quad \frac{a^m}{a^n} = a^{m-n} \right.$$

$$(a^m)^n = (a^n)^m = a^{m \cdot n} \quad | \quad a^n \cdot b^n = (a \cdot b)^n$$

$$\left(\frac{a^m}{b^n}\right)^p = \frac{a^{mp}}{b^{np}} \quad \left| \quad \frac{a^n}{b^n} = \left(\frac{a}{b}\right)^n \right.$$

$$a^{\frac{m}{n}} = \sqrt[n]{a^m} \quad \left| \quad a^{-m} = \frac{1}{a^m} \right.$$

$$a^0 = 1 \quad (a \neq 0) \quad | \quad \spadesuit^0 = 1$$

Trigonometrische Formeln

$$\sin(A \pm B) = \sin A \cdot \cos B \pm \cos A \cdot \sin B$$

$$\cos(A \pm B) = \cos A \cdot \cos B \mp \sin A \cdot \sin B$$

$$\tan(A \pm B) = \frac{\tan A \pm \tan B}{1 \mp \tan A \cdot \tan B}$$

$$\sin 2A = 2 \cdot \sin A \cdot \cos A$$

$$\cos 2A = \cos^2 A - \sin^2 A = 2\cos^2 A - 1 = 1 - 2\sin^2 A$$

$$\tan 2A = \frac{2\tan A}{1 - \tan^2 A}$$

$$\sin \frac{A}{2} = \sqrt{\frac{1 - \cos A}{2}}$$

$$\cos \frac{A}{2} = \sqrt{\frac{1 + \cos A}{2}}$$

$$\tan \frac{A}{2} = \sqrt{\frac{1 - \cos A}{1 + \cos A}}$$

$$\sin A \cos B = \frac{1}{2} \cdot [\sin(A+B) + \sin(A-B)]$$

$$\cos A \sin B = \frac{1}{2} \cdot [\sin(A+B) - \sin(A-B)]$$

$$\cos A \cos B = \frac{1}{2} \cdot [\cos(A+B) + \cos(A-B)]$$

$$\sin A \sin B = \frac{1}{2} \cdot [\cos(A-B) - \cos(A+B)]$$

$$\sin^2 \alpha + \cos^2 \alpha = 1$$

$$1 + \tan^2 \alpha = \frac{1}{\cos^2 \alpha}$$

$$1 + \cot^2 \alpha = \frac{1}{\sin^2 \alpha}$$

$$\tan \alpha = \frac{\sin \alpha}{\cos \alpha}$$

$$\cot \alpha = \frac{\cos \alpha}{\sin \alpha}$$

Logarithmen $\log_a r = x \quad | \quad r = a^x$

$$\log_c a \cdot b = \log_c a + \log_c b$$

$$\ln_c a \cdot b = \ln_c a + \ln_c b$$

$$\log_c \frac{a}{b} = \log_c a - \log_c b$$

$$\ln_c \frac{a}{b} = \ln_c a - \ln_c b$$

$$\log_c a^m = m \log_c a \quad | \quad \ln_c a^m = m \ln_c a$$

$$\log_a a = 1 \quad | \quad \lg 10 = \log_{10} 10 = 1 \quad | \quad \ln e = 1$$

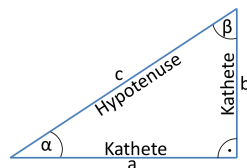
$$a^{\log_a} = 1 \quad | \quad 10^{\lg} = 10^{\log_{10}} = 1 \quad | \quad e^{\ln} = 1$$

$$\log_b a = \frac{\log_c a}{\log_c b} \quad | \quad \log_b a = \frac{\ln a}{\ln b}$$

$$\log_a b = \frac{1}{\log_b a}$$



$$\begin{array}{ccccccc} & & 1 & & & & \\ & 1 & & 1 & & & \\ & 1 & 2 & 1 & & & \\ & 1 & 3 & 3 & 1 & & \\ & 1 & 4 & 6 & 4 & 1 & \\ 1 & 5 & 10 & 10 & 5 & 1 & \end{array}$$



$$\sin 30^\circ = \cos 60^\circ = \frac{1}{2} \quad | \quad \sin 60^\circ = \cos 30^\circ = \frac{\sqrt{3}}{2}$$

$$\sin 45^\circ = \cos 45^\circ = \frac{1}{\sqrt{2}} = \frac{\sqrt{2}}{2}$$

Vektoren

Komponentendarstellung

$$\vec{a} \pm \vec{b} = \begin{pmatrix} a_x \\ a_y \\ a_z \end{pmatrix} \pm \begin{pmatrix} b_x \\ b_y \\ b_z \end{pmatrix} = \begin{pmatrix} a_x \pm b_x \\ a_y \pm b_y \\ a_z \pm b_z \end{pmatrix}$$

Multiplikation eines Vektors mit einem Skalar

$$\lambda \cdot \vec{a} = \lambda \cdot \begin{pmatrix} a_x \\ a_y \\ a_z \end{pmatrix} = \begin{pmatrix} \lambda \cdot a_x \\ \lambda \cdot a_y \\ \lambda \cdot a_z \end{pmatrix} \quad (\lambda \in \mathbb{R})$$

Skalarprodukt

$$\vec{a} \cdot \vec{b} = |\vec{a}| \cdot |\vec{b}| \cdot \cos \varphi \quad (0 \leq \varphi \leq 180^\circ)$$

Orthogonalität

$$\vec{a} \cdot \vec{b} = 0 \Leftrightarrow \vec{a} \perp \vec{b}$$

Kreuzprodukt

$$\vec{a} \times \vec{b} = \begin{pmatrix} a_x \\ a_y \\ a_z \end{pmatrix} \times \begin{pmatrix} b_x \\ b_y \\ b_z \end{pmatrix} = \begin{pmatrix} a_y b_z - a_z b_y \\ a_z b_x - a_x b_z \\ a_x b_y - a_y b_x \end{pmatrix}$$

Kollineare Vektoren

$$\vec{a} \times \vec{b} = \vec{0} \Leftrightarrow \vec{a} \parallel \vec{b} \text{ oder } \vec{a} \updownarrow \vec{b}$$

Spatprodukt

$$[\vec{a} \vec{b} \vec{c}] = \vec{a} \cdot (\vec{b} \times \vec{c})$$

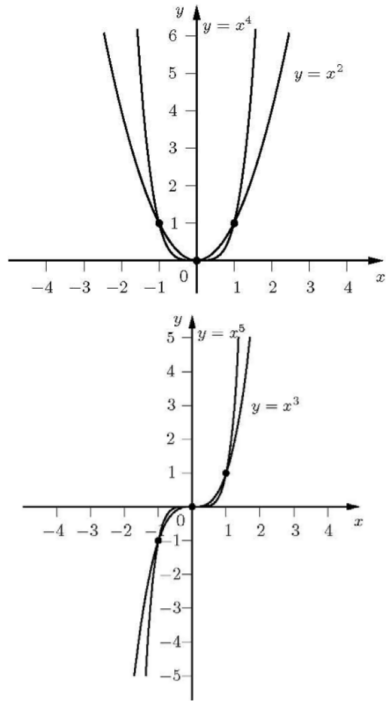
$$\begin{vmatrix} a_x & a_y & a_z \\ b_x & b_y & b_z \\ c_x & c_y & c_z \end{vmatrix}$$

Komplanare Vektoren

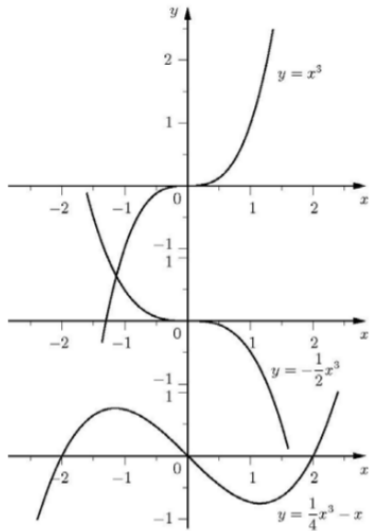
$$[\vec{a} \vec{b} \vec{c}] = 0 \Leftrightarrow \vec{a}, \vec{b}, \vec{c} \text{ sind komplanar} \\ (\text{liegen in einer Ebene})$$



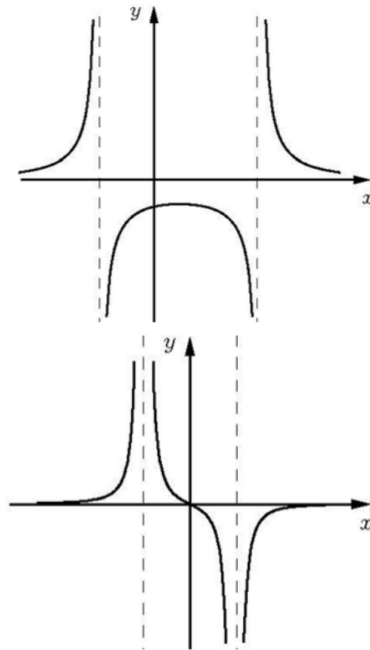
1. Parabel gerade/ungerade



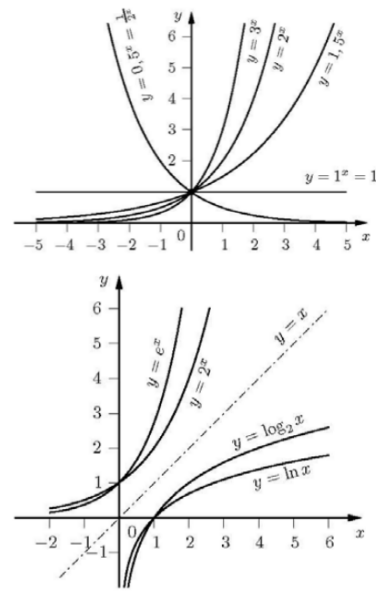
2. Kubische Funktionen



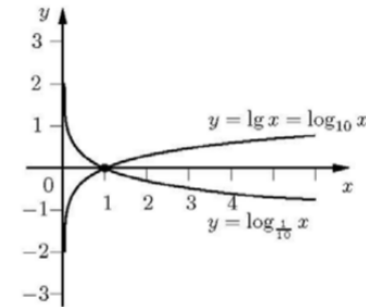
3. Polen un-/gerader Ordnung



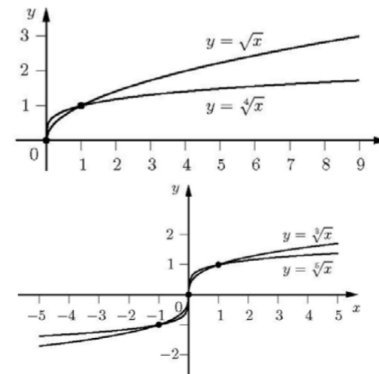
4. a^x , e^x , $\ln x$, $\lg x$



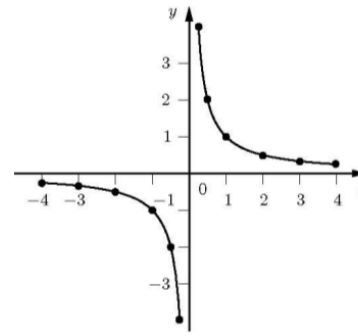
5. $\lg x$



6. Wurzelfunktionen



7. Hyperbel $y = \frac{1}{x}$



Notizen