$\sin(x+y) = \sin x\cos y + \cos x\sin y$	$\sin(z\pm\pi) = -\sin z$
$\sin(x-y) = \sin x\cos y - \cos x\sin y$	$\cos(z\pm\pi) = -\cos z$
$\cos(x+y) = \cos x\cos y - \sin x\sin y$	$\cos z = \cos(-z)$
$\cos(x-y) = \cos x\cos y + \sin x\sin y$	$\sin(-z) = -\sin z$

$\cos^2 z + \sin^2 z = 1$	$\cosh^2 z - \sinh^2 z = 1$	$\cosh(\mathrm{i}z) = \cos z$
$\mathrm{e}^{\mathrm{i}z} = \cos z + \mathrm{i}\sin z$	$\mathrm{e}^z = \cosh z + \sinh z$	$\sinh(\mathrm{i}z) = \mathrm{i}\sin z$
$2\cos z = \mathrm{e}^{\mathrm{i}z} + \mathrm{e}^{-\mathrm{i}z}$	$2\cosh z = \mathrm{e}^z + \mathrm{e}^{-z}$	$\cos(\mathrm{i}z) = \cosh z$
$2\mathrm{i}\sin z = \mathrm{e}^{\mathrm{i}z} - \mathrm{e}^{-\mathrm{i}z}$	$2\sinh z = \mathrm{e}^z - \mathrm{e}^{-z}$	$\sin(\mathrm{i}z) = \mathrm{i}\sinh z$

$\mathrm{e}^z = \sum_{k=0}^{\infty}\frac{z^k}{k!}$	$\mathrm{e}^z = \lim_{n\to\infty}\left(1+\frac{z}{n}\right)^n$	$\ln z = \lim_{h\to 0}\frac{z^h-1}{h}$

$\sin z = \sum_{k=0}^{\infty}(-1)^k\frac{z^{2k+1}}{(2k+1)!}$	$\sinh z = \sum_{k=0}^{\infty}\frac{z^{2k+1}}{(2k+1)!}$
$\cos z = \sum_{k=0}^{\infty}(-1)^k\frac{z^{2k}}{(2k)!}$	$\cosh z = \sum_{k=0}^{\infty}\frac{z^{2k}}{(2k)!}$

$$\sum_{k=m}^{n-1} q^k = \frac{q^m-q^n}{q-1},\qquad \sum_{k=m}^{n-1} k^p q^k = \left(q\frac{\mathrm{d}}{\mathrm{d}q}\right)^p\frac{q^m-q^n}{q-1}$$

$\sum_{k=1}^{n} k = (n/2)(n+1)$	$\sum_{k=m}^{n-1}(\Delta a)_k = a_n - a_m$
$\sum_{k=1}^{n} k^2 = (n/6)(n+1)(2n+1)$	$(\Delta a)_k := a_{k+1} - a_k$
$\sum_{k=1}^{n} k^3 = (n/2)^2(n+1)^2$	

$$(a+b)^n = \sum_{k=0}^{n}\binom{n}{k}a^{n-k}b^k,\qquad \binom{n}{k} := \frac{1}{k!}n^{\underline{k}} = \frac{n!}{k!(n-k)!}$$

$$\frac{z}{\mathrm{e}^z-1} = \sum_{k=0}^{\infty}\overline{B}_k\frac{x^k}{k!},\qquad \frac{z}{1-\mathrm{e}^{-z}} = \sum_{k=0}^{\infty}B_k\frac{x^k}{k!}$$

$$f[a](z) := \mathrm{e}^{(z-a)D}f(a) = \sum_{k=0}^{\infty}\frac{f^{(k)}(a)}{k!}(z-a)^k$$

$f(x) = f(2a-x)$ (Achsensymmetrie)

$f(x) = 2b - f(2a-x)$ (Punktsymmetrie)

$(\mathrm{e}^x)' = \mathrm{e}^x$	$(fg)' = f'g + g'f$
$\ln' x = 1/x$	$(f/g)' = (f'g - g'f)/g^2$
$(a^x)' = a^x\ln a$	$(g\circ f)' = (g'\circ f)f'$
$(x^n)' = nx^{n-1}$	$(f^{-1})' = 1/(f'\circ f^{-1})$

$\sin' x = \cos x$	$\tan' x = 1 + \tan^2 x = 1/\cos^2 x$
$\cos' x = -\sin x$	$\cot' x = -1 - \cot^2 x = -1/\sin^2 x$
$\sinh' x = \cosh x$	$\tanh' x = 1 - \tanh^2 x = 1/\cosh^2 x$
$\cosh' x = \sinh x$	$\coth' x = 1 - \coth^2 x = -1/\sinh^2 x$

$\arcsin' x = 1/\sqrt{1-x^2}$	$\arctan' x = 1/(1+x^2)$
$\arccos' x = -1/\sqrt{1-x^2}$	$\operatorname{arccot}' x = -1/(1+x^2)$
$\operatorname{arsinh}' x = 1/\sqrt{x^2+1}$	$\operatorname{artanh}' x = 1/(1-x^2)$
$\operatorname{arcosh}' x = 1/\sqrt{x^2-1}$	$\operatorname{arcoth}' x = 1/(1-x^2)$

$\nabla(\lvert\mathbf{x}\rvert^2) = 2\mathbf{x}$	$\nabla(fg) = g\nabla f + f\nabla g$
$\nabla\lvert\mathbf{x}\rvert = \mathbf{x}/\lvert\mathbf{x}\rvert$	$\nabla\langle f,g\rangle = (Df)^T g + (Dg)^T f$
$\nabla(\frac{1}{g}) = -\frac{\nabla g}{g^2}$	$\nabla(f/g) = (g\nabla f - f\nabla g)/g^2$

$$t = \tan(\tfrac{x}{2}),\ \sin x = \tfrac{2t}{1+t^2},\ \cos x = \tfrac{1-t^2}{1+t^2},\ \mathrm{d}x = \tfrac{2\mathrm{d}t}{1+t^2}$$

$$L\{f(t)\} := \int_0^{\infty} f(t)\mathrm{e}^{-pt}\mathrm{d}t,\ F\{f(t)\} := \tfrac{1}{\sqrt{2\pi}}\int_{-\infty}^{\infty} f(t)\mathrm{e}^{-\mathrm{i}\omega t}\mathrm{d}t$$

$$\int_\gamma f\,\mathrm{d}s := \int_a^b f(t)\,\lvert\gamma'(t)\rvert\,\mathrm{d}t$$

$z = r\mathrm{e}^{\mathrm{i}\varphi} = a + b\mathrm{i}$	$\lvert z\rvert = r = \sqrt{a^2+b^2}$
$\overline{z} = r\mathrm{e}^{-\mathrm{i}\varphi} = a - b\mathrm{i}$	$\arg(z) = \varphi = \operatorname{sgn}(b)\arccos(a/r)$
$\operatorname{Re} z = a = r\cos\varphi$	$z_1 + z_2 = (a_1+a_2) + (b_1+b_2)\mathrm{i}$
$\operatorname{Im} z = b = r\sin\varphi$	$z_2 - z_2 = (a_1-a_2) + (b_1-b_2)\mathrm{i}$

$$z_1z_2 = r_1r_2\mathrm{e}^{\mathrm{i}(\varphi_1+\varphi_2)} = (a_1a_2 - b_1b_2) + (a_1b_2 + a_2b_1)\mathrm{i}$$

$$\frac{z_1}{z_2} = \frac{r_1}{r_2}\mathrm{e}^{\mathrm{i}(\varphi_1-\varphi_2)} = \frac{a_1a_2+b_1b_2}{a_2^2+b_2^2} + \frac{a_2b_1-a_1b_2}{a_2^2+b_2^2}\mathrm{i}$$

$$\frac{1}{z} = \frac{1}{r}\mathrm{e}^{-\mathrm{i}\varphi} = \frac{a}{a^2+b^2} - \frac{b}{a^2+b^2}\mathrm{i}$$

$$x^2 + px + q = 0:\ \ x = -\tfrac{p}{2} \pm \tfrac{1}{2}\sqrt{p^2-4q}$$

$$\begin{bmatrix} a & b \\ c & d \end{bmatrix}^{-1} = \frac{1}{ad-bc}\begin{bmatrix} d & -b \\ -c & a \end{bmatrix},\quad R(\varphi) = \begin{bmatrix} \cos\varphi & -\sin\varphi \\ \sin\varphi & \cos\varphi \end{bmatrix}$$

Polarkoordinaten	**Kugelkoordinaten**
$x = r\cos\varphi$	$x = r\sin\theta\,\cos\varphi$
$y = r\sin\varphi$	$y = r\sin\theta\,\sin\varphi$
$\varphi\in(-\pi,\pi]$	$z = r\cos\theta$
$\det J = r$	$\varphi\in(-\pi,\pi],\ \theta\in[0,\pi]$
	$\det J = r^2\sin\theta$
Zylinderkoordinaten	
$x = r_{xy}\cos\varphi$	$\theta = \beta - \pi/2$
$y = r_{xy}\sin\varphi$	$\beta\in[-\pi/2,\pi/2]$
$z = z$	$\cos\theta = \sin\beta$
$\det J = r_{xy}$	$\sin\theta = \cos\beta$

$\langle Av,w\rangle = \langle v,A^Hw\rangle$	$(AB)^H = B^HA^H$
$\langle v,w\rangle = \lvert v\rvert\lvert w\rvert\cos\varphi$	$(AB)^{-1} = B^{-1}A^{-1}$
$\lvert v\times w\rvert = \lvert v\rvert\lvert w\rvert\sin\varphi$	$\det(AB) = \det(A)\det(B)$

$$\operatorname{proj}[w](v) = \tfrac{\langle v,w\rangle}{\langle w,w\rangle}w,\quad w_k := v_k - \textstyle\sum_{i=1}^{k-1}\operatorname{proj}[w_i](v_k)$$

$$y = \overline{y} + \frac{s_{xy}}{s_x}(x-\overline{x}),\ \ s_x = \sum_{k=1}^{n}(x_k-\overline{x})^2,\ \ s_{xy} = \sum_{k=1}^{n}(x_k-\overline{x})(y_k-\overline{y})$$

$$n! = n\cdot(n-1)!,\quad \Gamma(z+1) = z\Gamma(z)$$

A	B	$A \wedge B$	$A \vee B$	$A \rightarrow B$	$A \leftrightarrow B$	$A \oplus B$	$A \uparrow B$
0	0	0	0	1	1	0	1
0	1	0	1	1	0	1	1
1	0	0	1	0	0	1	1
1	1	1	1	1	1	0	0

Disjunktion	**Konjunktion**	**Bezeichnung**
$A \vee A \equiv A$	$A \wedge A \equiv A$	Idempotenzgesetze
$A \vee 0 \equiv A$	$A \wedge 1 \equiv A$	Neutralitätsgesetze
$A \vee 1 \equiv 1$	$A \wedge 0 \equiv 0$	Extremalgesetze
$A \vee \overline{A} \equiv 1$	$A \wedge \overline{A} \equiv 0$	Komplementärgesetze
$A \vee B \equiv B \vee A$	$A \wedge B \equiv B \wedge A$	Kommutativgesetze
$(A \vee B) \vee C \equiv A \vee (B \vee C)$	$(A \wedge B) \wedge C \equiv A \wedge (B \wedge C)$	Assoziativgesetze
$\overline{A \vee B} \equiv \overline{A} \wedge \overline{B}$	$\overline{A \wedge B} \equiv \overline{A} \vee \overline{B}$	De Morgansche Regeln
$A \vee (A \wedge B) \equiv A$	$A \wedge (A \vee B) \equiv A$	Absorptionsgesetze

$(A \rightarrow B) \equiv \overline{A} \vee B$ | $(A \leftrightarrow B) \equiv (A \rightarrow B) \wedge (B \rightarrow A)$

$(A \rightarrow B) \equiv (\overline{B} \rightarrow \overline{A})$ | $(A \leftrightarrow B) \equiv (\overline{A} \vee B) \wedge (\overline{B} \vee A)$

$A \vee \forall_x P_x \equiv \forall_x (A \vee P_x)$ | $\forall_x (P_x \wedge Q_x) \equiv \forall_x P_x \wedge \forall_x Q_x$

$A \wedge \exists_x P_x \equiv \exists_x (A \wedge P_x)$ | $\exists_x (P_x \vee Q_x) \equiv \exists_x P_x \vee \exists_x Q_x$

$(I \models M) :\Leftrightarrow \forall \varphi \in M\colon I(\varphi)$

$(\models \varphi) :\Leftrightarrow \forall I\colon I(\varphi)$ | $(M \models \varphi) :\Leftrightarrow \forall I\colon ((I \models M) \Rightarrow I(\varphi))$

$\mathrm{erf}(\varphi) :\Leftrightarrow \exists I\colon I(\varphi)$ | $\mathrm{erf}(M) :\Leftrightarrow \exists I\colon (I \models M)$

$\mathrm{erf}(\{\varphi_1, \ldots, \varphi_n\}) \Leftrightarrow \mathrm{erf}(\varphi_1 \wedge \ldots \wedge \varphi_n)$

$\mathrm{erf}(\varphi_1 \vee \ldots \vee \varphi_n) \Leftrightarrow \mathrm{erf}(\varphi_1) \vee \ldots \vee \mathrm{erf}(\varphi_n)$

$(M \vdash \varphi) \Rightarrow (M \models \varphi)$ (Korrektheit)

$(M \models \varphi) \Rightarrow (M \vdash \varphi)$ (Vollständigkeit)

$(M \cup \{\varphi\} \vdash \psi) \Leftrightarrow (M \vdash \varphi \rightarrow \psi)$

$(M \cup \{\varphi\} \models \psi) \Leftrightarrow (M \models \varphi \rightarrow \psi)$

$A \cap B := \{x \mid x \in A \wedge x \in B\}$ | $A \subseteq B :\Leftrightarrow \forall_x (x \in A \Rightarrow x \in B)$

$A \cup B := \{x \mid x \in A \vee x \in B\}$ | $A = B :\Leftrightarrow \forall_x (x \in A \Leftrightarrow x \in B)$

$A \setminus B := \{x \mid x \in A \wedge x \notin B\}$ | $A = B :\Leftrightarrow A \subseteq B \wedge B \subseteq A$

$\bigcap_{i \in I} A_i := \{x \mid \forall i \in I\colon x \in A_i\}$ | $f(M) := \{y \mid \exists x \in M\colon y = f(x)\}$

$\bigcup_{i \in I} A_i := \{x \mid \exists i \in I\colon x \in A_i\}$ | $f^{-1}(N) := \{x \mid f(x) \in N\}$

$A \times B := \{t \mid \exists x \in A\colon \exists y \in B\colon t = (x, y)\}$

$A \subseteq B \Leftrightarrow A \cup B = B \Leftrightarrow A \cap B = A$

$f(M \cup N) = f(M) \cup f(N)$ | $f^{-1}(M \cup N) = f^{-1}(M) \cup f^{-1}(N)$

$f(M \cap N) \subseteq f(M) \cap f(N)$ | $f^{-1}(M \cap N) = f^{-1}(M) \cap f^{-1}(N)$

$M \subseteq N \Rightarrow f(M) \subseteq f(N)$ | $M \subseteq N \Rightarrow f^{-1}(M) \subseteq f^{-1}(N)$

$(g \circ f)(M) = g(f(M))$ | $(g \circ f)^{-1}(M) = f^{-1}(g^{-1}(M))$