

$\sin^2 x + \cos^2 x = 1$ $\sin(x \pm y) = \sin x \cos y \pm \cos x \sin y$ $\cos(x \pm y) = \cos x \cos y \mp \sin x \sin y$ $\sin 2x = 2 \sin x \cos x$ $\cos 2x = \cos^2 x - \sin^2 x$ $\operatorname{tg}(x \pm y) = \frac{\operatorname{tg} x \pm \operatorname{tg} y}{1 \mp \operatorname{tg} x \operatorname{tg} y}$ $\sin x + \sin y = 2 \sin \frac{x+y}{2} \cos \frac{x-y}{2}$ $\cos x + \cos y = 2 \cos \frac{x+y}{2} \cos \frac{x-y}{2}$ $\sin x \sin y = -\frac{1}{2} [\cos(x+y) - \cos(x-y)]$ $\sin x \cos y = \frac{1}{2} [\sin(x+y) + \sin(x-y)]$ $\cos x \cos y = \frac{1}{2} [\cos(x+y) + \cos(x-y)]$ $\cos x = \frac{e^{ix} + e^{-ix}}{2}$ $\sin x = \frac{e^{ix} - e^{-ix}}{2i}$	$(cf)' = cf'$ $(f \pm g)' = f' \pm g'$ $(fg)' = f'g + fg'$ $\left(\frac{f}{g}\right)' = \frac{f'g - fg'}{g^2}$ $(f \circ g)' = (f' \circ g)g'$	$\int cf(x)dx = c \int f(x)dx$ $\int (f(x) \pm g(x))dx = \int f(x)dx \pm \int g(x)dx$ $\int f'(ax+b)dx = \frac{1}{a}f(ax+b) + C$ $\int f^\alpha(x)f'(x)dx = \begin{cases} \frac{f^{\alpha+1}}{\alpha+1} + C & (\alpha \neq -1) \\ \ln f(x) + C & (\alpha = -1) \end{cases}$ $\int f(x)g'(x)dx = f(x)g(x) - \int f'(x)g(x)dx$
$\operatorname{ch}^2 x - \operatorname{sh}^2 x = 1$ $\operatorname{sh} 2x = 2 \operatorname{sh} x \operatorname{ch} x$ $\operatorname{ch} 2x = \operatorname{ch}^2 x + \operatorname{sh}^2 x$ $\operatorname{ch} x = \frac{e^x + e^{-x}}{2}$ $\operatorname{sh} x = \frac{e^x - e^{-x}}{2}$ $\operatorname{arsh} x = \ln(x + \sqrt{x^2 + 1})$ $\operatorname{arch} x = \ln(x + \sqrt{x^2 - 1})$ $\operatorname{arth} x = \frac{1}{2} \ln \frac{1+x}{1-x}$ $\operatorname{arcth} x = \frac{1}{2} \ln \frac{x+1}{x-1}$	$(x^\alpha)' = \alpha x^{\alpha-1}$ $(a^x)' = (\ln a)a^x$ $(\log_a x)' = \frac{1}{\ln a} \frac{1}{x}$ $(\sin x)' = \cos x$ $(\cos x)' = -\sin x$ $(\operatorname{tg} x)' = \frac{1}{\cos^2 x} = 1 + \operatorname{tg}^2 x$ $(\operatorname{ctg} x)' = -\frac{1}{\sin^2 x} = -1 - \operatorname{ctg}^2 x$ $(\arcsin x)' = -(\arccos x)' = \frac{1}{\sqrt{1-x^2}}$ $(\arctan x)' = -(\operatorname{arccot} x)' = \frac{1}{1+x^2}$ $(\operatorname{sh} x)' = \operatorname{ch} x$ $(\operatorname{ch} x)' = \operatorname{sh} x$ $(\operatorname{th} x)' = \frac{1}{\operatorname{ch}^2 x} = 1 - \operatorname{th}^2 x$ $(\operatorname{cth} x)' = -\frac{1}{\operatorname{sh}^2 x} = 1 - \operatorname{cth}^2 x$ $(\operatorname{arsh} x)' = \frac{1}{\sqrt{x^2+1}}$ $(\operatorname{arch} x)' = \frac{1}{\sqrt{x^2-1}}$ $(\operatorname{arth} x)' = \frac{1}{1-x^2}$ $(\operatorname{arcth} x)' = \frac{1}{1-x^2}$	$t = \operatorname{tg} \frac{x}{2} \quad \sin x = \frac{2t}{1+t^2}$ $\frac{dx}{dt} = \frac{2}{1+t^2} \quad \cos x = \frac{1-t^2}{1+t^2}$ $u = \operatorname{th} \frac{x}{2} \quad \operatorname{sh} x = \frac{2u}{1-u^2}$ $\frac{dx}{du} = \frac{2}{1-u^2} \quad \operatorname{ch} x = \frac{1+u^2}{1-u^2}$ $e^x = 1 + \frac{x}{1!} + \frac{x^2}{2!} + \frac{x^3}{3!} + \dots + \frac{x^n}{n!} + \dots$ $\cos x = 1 - \frac{x^2}{2!} + \frac{x^4}{4!} - \frac{x^6}{6!} + \dots + (-1)^n \frac{x^{2n}}{(2n)!} + \dots$ $\sin x = x - \frac{x^3}{3!} + \frac{x^5}{5!} - \frac{x^7}{7!} + \dots + (-1)^{n-1} \frac{x^{2n-1}}{(2n-1)!} + \dots$ $\operatorname{ch} x = 1 + \frac{x^2}{2!} + \frac{x^4}{4!} + \frac{x^6}{6!} + \dots + \frac{x^{2n}}{(2n)!} + \dots$ $\operatorname{sh} x = x + \frac{x^3}{3!} + \frac{x^5}{5!} + \frac{x^7}{7!} + \dots + \frac{x^{2n-1}}{(2n-1)!} + \dots$ $\frac{1}{1-x} = 1 + x + x^2 + x^3 + \dots + x^n + \dots$ $(1+x)^\alpha = 1 + \alpha x + \frac{\alpha(\alpha-1)}{2} x^2 + \dots + \binom{\alpha}{n} x^n + \dots$

$$(1+x)^n \geq 1+nx$$

$$\det A = \sum_{i=1}^n (-1)^{i+j} a_{ij} \det A_{ij}$$

$$\binom{\alpha}{n} = \frac{\alpha(\alpha-1)\cdots(\alpha-n+1)}{n!}$$

$$\frac{n}{\frac{1}{a_1} + \frac{1}{a_2} + \cdots + \frac{1}{a_n}} \leq \sqrt[n]{a_1 a_2 \cdots a_n} \leq \frac{a_1 + a_2 + \cdots + a_n}{n} \leq \sqrt{\frac{a_1^2 + a_2^2 + \cdots + a_n^2}{n}}$$

$$\text{grad } f = \frac{\partial f}{\partial x} \mathbf{i} + \frac{\partial f}{\partial y} \mathbf{j} + \frac{\partial f}{\partial z} \mathbf{k}$$

$$\text{div } \mathbf{u} = \frac{\partial u_x}{\partial x} + \frac{\partial u_y}{\partial y} + \frac{\partial u_z}{\partial z}$$

$$\text{rot } \mathbf{u} = \begin{vmatrix} \mathbf{i} & \mathbf{j} & \mathbf{k} \\ \frac{\partial}{\partial x} & \frac{\partial}{\partial y} & \frac{\partial}{\partial z} \\ u_x & u_y & u_z \end{vmatrix} = \left(\frac{\partial u_z}{\partial y} - \frac{\partial u_y}{\partial z} \right) \mathbf{i} + \left(\frac{\partial u_x}{\partial z} - \frac{\partial u_z}{\partial x} \right) \mathbf{j} + \left(\frac{\partial u_y}{\partial x} - \frac{\partial u_x}{\partial y} \right) \mathbf{k}$$

$$D\mathbf{u} = \begin{bmatrix} \frac{\partial u_x}{\partial x} & \frac{\partial u_x}{\partial y} & \frac{\partial u_x}{\partial z} \\ \frac{\partial u_y}{\partial x} & \frac{\partial u_y}{\partial y} & \frac{\partial u_y}{\partial z} \\ \frac{\partial u_z}{\partial x} & \frac{\partial u_z}{\partial y} & \frac{\partial u_z}{\partial z} \end{bmatrix}$$

$$a_0 + \sum_{n=1}^{\infty} \left(a_n \cos \frac{2\pi nx}{T} + b_n \sin \frac{2\pi nx}{T} \right)$$

$$a_0 = \frac{1}{T} \int_0^T f(x) dx$$

$$a_n = \frac{2}{T} \int_0^T f(x) \cos \frac{2\pi nx}{T} dx$$

$$b_n = \frac{2}{T} \int_0^T f(x) \sin \frac{2\pi nx}{T} dx$$

$$\int_C f ds = \int_a^b f(\mathbf{r}(t)) |\dot{\mathbf{r}}(t)| dt$$

$$\int_C \mathbf{u} \cdot d\mathbf{r} = \int_a^b \mathbf{u}(\mathbf{r}(t)) \cdot \dot{\mathbf{r}}(t) dt$$

$$\iint_S f dA = \iint_D f(\mathbf{r}(u,v)) \left| \frac{\partial \mathbf{r}}{\partial u} \times \frac{\partial \mathbf{r}}{\partial v} \right| du dv$$

$$\iint_S \mathbf{u} \cdot d\mathbf{A} = \iint_D \mathbf{u}(\mathbf{r}(u,v)) \cdot \left(\frac{\partial \mathbf{r}}{\partial u} \times \frac{\partial \mathbf{r}}{\partial v} \right) du dv$$

$$\iiint_V f dV = \iiint_D f(\mathbf{r}(u,v,w)) \left| \frac{\partial \mathbf{r}}{\partial u} \frac{\partial \mathbf{r}}{\partial v} \frac{\partial \mathbf{r}}{\partial w} \right| du dv dw$$

$$\int_C \text{grad } f \cdot d\mathbf{r} = f(\mathbf{r}(b)) - f(\mathbf{r}(a))$$

$$\iint_S \text{rot } \mathbf{u} \cdot d\mathbf{A} = \int_{\partial S} \mathbf{u} \cdot d\mathbf{r}$$

$$\iiint_V \text{div } \mathbf{u} dV = \iint_{\partial V} \mathbf{u} \cdot d\mathbf{A}$$

$$\iint_{\partial V} f \text{grad } g \cdot d\mathbf{A} = \iiint_V (f \Delta g + \text{grad } f \cdot \text{grad } g) dV$$

$$\iiint_V (f \Delta g - g \Delta f) dV = \iint_{\partial V} (f \text{grad } g - g \text{grad } f) \cdot d\mathbf{A}$$

$$\text{rot grad } f = 0$$

$$\text{div rot } \mathbf{u} = 0$$

$$\text{grad } cf = c \text{grad } f$$

$$\text{div } c\mathbf{u} = c \text{div } \mathbf{u}$$

$$\text{rot } c\mathbf{u} = c \text{rot } \mathbf{u}$$

$$\text{grad}(f \pm g) = \text{grad } f \pm \text{grad } g$$

$$\text{div}(\mathbf{u} \pm \mathbf{v}) = \text{div } \mathbf{u} \pm \text{div } \mathbf{v}$$

$$\text{rot}(\mathbf{u} \pm \mathbf{v}) = \text{rot } \mathbf{u} \pm \text{rot } \mathbf{v}$$

$$\text{grad}(fg) = (\text{grad } f)g + f \text{grad } g$$

$$\text{div}(f\mathbf{u}) = (\text{grad } f) \cdot \mathbf{u} + f \text{div } \mathbf{u}$$

$$\text{rot}(f\mathbf{u}) = (\text{grad } f) \times \mathbf{u} + f \text{rot } \mathbf{u}$$

$$\text{grad}(\mathbf{u} \cdot \mathbf{v}) = D\mathbf{u}(\mathbf{v}) + D\mathbf{v}(\mathbf{u}) + \mathbf{u} \times \text{rot } \mathbf{v} + \mathbf{v} \times \text{rot } \mathbf{u}$$

$$\text{rot}(\mathbf{u} \times \mathbf{v}) = D\mathbf{u}(\mathbf{v}) - D\mathbf{v}(\mathbf{u}) + (\text{div } \mathbf{v}) \cdot \mathbf{u} - (\text{div } \mathbf{u}) \cdot \mathbf{v}$$

$$\text{div}(\mathbf{u} \times \mathbf{v}) = (\text{rot } \mathbf{u}) \cdot \mathbf{v} - \mathbf{u} \cdot (\text{rot } \mathbf{v})$$

$$(\mathcal{L}f)(z) = \int_0^{\infty} f(x) e^{-zx} dx$$

$$(f * g)(x) = \int_0^x f(s)g(x-s) ds$$

$$h(x) \quad (\mathcal{L}h)(z)$$

$$1 \quad \frac{1}{z}$$

$$x^n \quad \frac{n!}{z^{n+1}}$$

$$e^{\alpha x} \quad \frac{1}{z - \alpha}$$

$$\cos bx \quad \frac{z}{z^2 + b^2}$$

$$\sin bx \quad \frac{b}{z^2 + b^2}$$

$$\text{ch } bx \quad \frac{z}{z^2 - b^2}$$

$$\text{sh } bx \quad \frac{b}{z^2 - b^2}$$

$$h(x) \quad (\mathcal{L}h)(z)$$

$$x^n f(x) \quad (-1)^n (\mathcal{L}f)^{(n)}(z)$$

$$e^{\alpha x} f(x) \quad (\mathcal{L}f)(z - \alpha)$$

$$f^{(n)}(x) \quad z^n (\mathcal{L}f)(z) - z^{n-1} f(0) - z^{n-2} f'(0) - \cdots - f^{(n-1)}(0)$$

$$(f * g)(x) \quad (\mathcal{L}f)(z)(\mathcal{L}g)(z)$$

$$P(x, y) + Q(x, y)y' = 0$$

$$\ln |M(x)| = \int \frac{\frac{\partial P(x,y)}{\partial y} - \frac{\partial Q(x,y)}{\partial x}}{Q(x,y)} dx$$

$$\ln |M(y)| = \int \frac{\frac{\partial Q(x,y)}{\partial x} - \frac{\partial P(x,y)}{\partial y}}{P(x,y)} dy$$