1 Mathematical formula

$$\cos\alpha = \frac{1}{2} \qquad \sin\beta = \frac{\sqrt{3}}{2} \qquad \tan\theta = 1$$

$$y^2 = 4 \qquad y = \pm 2$$

$$a^x + y \neq a^{x+y}$$

$$(a_1 + a_2)a_3 = a_1a_3 + a_2a_3$$

2 Integral operator

$$\int x^2 \mathrm{d}x = \frac{x^3}{3}$$

$$\int_0^1 x^2 \mathrm{d}x = \frac{1}{3}$$

$$\int \frac{1}{x} \mathrm{d}x = \ln x$$

$$\iint_D (x^2 + y^2) \mathrm{d}x\mathrm{d}y$$

$$\iiint (x^2 + y^2 + z^2) \mathrm{d}x\mathrm{d}y\mathrm{d}z$$

$$\int x^2 \mathrm{d}x = \frac{x^3}{3}$$

$$\iiint (x + y + z) \mathrm{d}x\mathrm{d}y\mathrm{d}z$$

3 differential operator

$$y' + p(x)y + q(x) = 0$$

$$y'' + py' + qy = 0$$

$$\frac{\mathrm{d}y}{\mathrm{d}x} = 2x$$

$$\frac{\mathrm{d}^2y}{\mathrm{d}x^2} - x\frac{\mathrm{d}y}{\mathrm{d}x} + u = 0$$

$$\frac{\partial u}{\partial t} + t\frac{\partial u}{\partial x} = 0$$

$$\frac{\partial^3 u}{\partial x^3} - 6u\frac{\partial u}{\partial x} + \frac{\partial u}{\partial t} = 0$$

4 Sum operator

$$\sum_{k=1}^{n} k^2 = \frac{1}{3}n^3 + \frac{1}{2}n^2 + \frac{1}{6}n$$

$$\lim_{n\to\infty} \sum_{k=1}^{n} \frac{1}{k^2} = \frac{\pi^2}{6}$$

5 Array

$$\begin{bmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \end{bmatrix}$$

$$\mathbf{H}_x = \frac{1}{3} \times \begin{bmatrix} 1 & 0 & 2 \\ 2 & 1 & 3 \\ 3 & 2 & 1 \end{bmatrix}$$

$$\begin{bmatrix} 1 & 2 & \cdots & 4 \\ 5 & 6 & \cdots & 7 \\ \vdots & \vdots & \ddots & \vdots \\ 8 & 9 & \cdots & 0 \end{bmatrix}$$

$$y = \begin{cases} a & d > 1 \\ b + x & d \leq 1 \end{cases}$$

6 eqnarray

$$\begin{aligned}\sin x &= x - \frac{x^3}{3} + \frac{x^5}{5} - \frac{x^7}{7} + x - \frac{x^3}{3} + \frac{x^5}{5} \\ &\quad \frac{x^7}{7}x - \frac{x^3}{3} + \frac{x^5}{5} - \frac{x^7}{7} + x + \frac{x^5}{5} + \cdots\end{aligned} \tag{1}$$

$$\begin{aligned}A &= (x-y)(x+y) \\ &= x^2 - yx + xy - y^2 \\ &= x^2 - y^2\end{aligned} \tag{2}$$

7 align

$$\begin{aligned}A &= (x-y)(x+y) \\ &= x^2 - yx + xy - y^2 \\ &= x^2 - y^2\end{aligned}$$

$$\begin{aligned}f(x) &= \cos x \\ f'(x) &= -\sin x \\ f''(x) &= -cosx\end{aligned}$$