In[∘]:=

```
Clear
清除
```

Out[∘]=

Clear

In[∘]:=

```
Limit[(Exp[x] - Exp[-x]) / (Sin[x]), x → 0]
极限    指数形式 指数形式    正弦
```

Out[∘]=

2

In[∘]:=

```
Limit[(1 - Cos[x]) / (x^2), x → 0]
极限       余弦
```

Out[∘]=

$$\frac{1}{2}$$

In[∘]:=

```
D[(1 - Log[x]) / (1 + Log[x]), x]
偏导  对数          对数
```

Out[∘]=

$$-\frac{1-\mathrm{Log}[x]}{x\,(1+\mathrm{Log}[x])^{2}}-\frac{1}{x\,(1+\mathrm{Log}[x])}$$

In[∘]:=

```
D[ArcTan[(1 + x) / (1 - x)], x]
… 反正切
```

Out[∘]=

$$\frac{\frac{1}{1-x}+\frac{1+x}{(1-x)^{2}}}{1+\frac{(1+x)^{2}}{(1-x)^{2}}}$$

In[◦]:=

```
D[x^(x^x), x]
```

偏导

Out[◦]=

$$x^{x^x}\left(x^{-1+x}+x^x \mathrm{Log}[x]\,(1+\mathrm{Log}[x])\right)$$

In[◦]:=

```
D[Log[Cos[ArcTan[(Exp[x] - Exp[-x]) / 2]]], x]
```

⋯ ⋯ ⋯ 反正切 指数形式 指数形式

Out[◦]=

$$-\frac{\left(-e^{-x}+e^{x}\right)\left(e^{-x}+e^{x}\right)}{4\left(1+\frac{1}{4}\left(-e^{-x}+e^{x}\right)^{2}\right)}$$

In[◦]:=

```
D[(1 + x) / Sqrt[1 - x], {x, 60}]
```

偏导 平方根

Out[◦]=

$$87894875568921902884253090598307649451923547315094294787079697172739171813012930524808746337890625 \Big/ \left(144115188075855872\,(1-x)^{119/2}\right) + \left(697299346180113762881741185413240685651926808699748071977498930903730763049902582163482720947265625\,(1+x)\right) \Big/ \left(1152921504606846976\,(1-x)^{121/2}\right)$$

In[◦]:=

```
Integrate[Log[x + Sqrt[1 + x^2]], x]
```

积分 对数 平方根

Out[◦]=

$$-\sqrt{1+x^2}+x\,\mathrm{Log}\left[x+\sqrt{1+x^2}\right]$$

In[◦]:=

```
Integrate[(Exp[2 * x] + 1) / (Exp[x] + 1), x]
```

积分 指数形式 指数形式

Out[◦]=

$$e^x+\mathrm{Log}[e^x]-2\,\mathrm{Log}[1+e^x]$$

In[∘]:=

```
Integrate[Integrate[ArcTan[y/x], x], y]
```

积分 积分 反正切

Out[∘]=

$$x\,y\,\mathrm{ArcTan}\left[\frac{y}{x}\right]-\frac{1}{2}x^2\,\mathrm{Log}\left[x^2+y^2\right]+\frac{1}{4}\left(-y^2+\left(x^2+y^2\right)\mathrm{Log}\left[x^2+y^2\right]\right)$$

In[∘]:=

```
Integrate[Integrate[Integrate[x y z (1 - x - y), x], y], z]
```

积分 积分 积分

Out[∘]=

$$-\frac{1}{24}x^2\,(-3+2x)\,y^2\,z^2-\frac{1}{12}x^2\,y^3\,z^2$$

In[∘]:=

```
Integrate[(Product[Sin[x/(2 k + 1)], {k, 0, 8}])/(x^9), {x, 0, Infinity}]
```

积分 无穷大

Out[∘]=

$$\frac{17\,708\,695\,183\,056\,190\,642\,497\,315\,530\,628\,422\,295\,569\,865\,119\,\pi}{1\,220\,462\,921\,565\,155\,916\,674\,902\,677\,397\,230\,198\,502\,690\,752\,000\,000\,000}$$

In[∘]:=

```
Integrate[Integrate[(x^2 + y^3), {y, 1, 1 - x}], {x, 1, 2}]
```

积分 积分

Out[∘]=

$$-\frac{79}{20}$$

In[∘]:=

```
Integrate[Integrate[r^2 Sin[y]^2, {r, 0, a}], {y, 0, 2 Pi}]
```

积分 积分 圆周

Out[∘]=

$$\frac{a^3\,\pi}{3}$$

In[◦]:=

```
Integrate[Integrate[x Sqrt[y], {y, x^2, Sqrt[x]}], {x, 0, 1}]
```
积分 积分 平方根 平方根

Out[◦]=

$$\frac{6}{55}$$

In[◦]:=

```
Integrate[Sqrt[1 + D[a Cosh[x/a], x]^2], {x, -a, a}]
```
积分 平方根

Out[◦]=

2 a Sinh[1]

In[◦]:=

```
Series[Exp[x^2], {x, 0, 5}]
```
级数 指数形式

Out[◦]=

$$1 + x^2 + \frac{x^4}{2} + O[x]^6$$

In[◦]:=

```
Series[(1 + x) Exp[-x], {x, 0, 5}]
```
级数 指数形式

Out[◦]=

$$1 - \frac{x^2}{2} + \frac{x^3}{3} - \frac{x^4}{8} + \frac{x^5}{30} + O[x]^6$$

In[◦]:=

```
DSolve[y''''[x] == y[x], y[x], x]
```
求解微分方程

Out[◦]=

$$\{\{y[x] \to e^x c_1 + e^{-x} c_3 + c_2 \mathrm{Cos}[x] + c_4 \mathrm{Sin}[x]\}\}$$

In[∘]:=

```
DSolve[{y'[x] + y[x] == a Sin[x], y[0] == 1}, y[x], x]
```

求解微分方程 正弦

Out[∘]=

$$\left\{\left\{y[x] \to -\frac{1}{2} e^{-x} \left(-2 - a + a e^{x} \mathrm{Cos}[x] - a e^{x} \mathrm{Sin}[x]\right)\right\}\right\}$$

In[∘]:=

```
DSolve[{x'[t] + y[t] == Cos[t], y'[t] + x[t] == Sin[t]}, {x[t], y[t]}, t]
```

求解微分方程 余弦 正弦

Out[∘]=

$$\left\{\left\{x[t] \to \frac{1}{2} e^{-t} \left(1 + e^{2t}\right) c_1 - \frac{1}{2} e^{-t} \left(-1 + e^{2t}\right) c_2 - \frac{1}{4} e^{-2t} \left(-1 + e^{2t}\right)^2 \mathrm{Sin}[t] + \frac{1}{4} \left(1 + e^{-2t}\right) \left(1 + e^{2t}\right) \mathrm{Sin}[t],\right.\right.$$
$$\left.\left. y[t] \to -\frac{1}{2} e^{-t} \left(-1 + e^{2t}\right) c_1 + \frac{1}{2} e^{-t} \left(1 + e^{2t}\right) c_2 - \frac{1}{4} \left(1 + e^{-2t}\right) \left(-1 + e^{2t}\right) \mathrm{Sin}[t] + \frac{1}{4} e^{-2t} \left(-1 + e^{2t}\right) \left(1 + e^{2t}\right) \mathrm{Sin}[t]\right\}\right\}$$

In[∘]:=

```
DSolve[(y + z) D[u[x, y, z], x] + (z + x) D[u[x, y, z], y] +
    (x + y) D[u[x, y, z], z] == 0, u[x, y, z], {x, y, z}]
```

求解微分方程 偏导 偏导 偏导

Out[∘]=

$$\mathrm{DSolve}\left[(x + y)\, u^{(0,0,1)}[x, y, z] + (x + z)\, u^{(0,1,0)}[x, y, z] + (y + z)\, u^{(1,0,0)}[x, y, z] == 0, u[x, y, z], \{x, y, z\}\right]$$

In[ ]:=

```
DSolve[(x^2 + y^2) D[u[x, y], x] + 6 * x * y D[u[x, y], y] == 0, u[x, y], {x, y}]
求解微分方程    偏导                偏导
```

DSolve: DSolve 使用了反函数，所以有些解可能找不到

Out[ ]=

$$\left\{\left\{u[x,y] \to c_1\left[\mathrm{Log}\left[\frac{(5x^2-y^2)^{3/5}}{y^{1/5}}\right]\right]\right\}, \left\{u[x,y] \to c_1\left[\mathrm{Log}\left[-\frac{(-1)^{1/5}(5x^2-y^2)^{3/5}}{y^{1/5}}\right]\right]\right\},\right.$$

$$\left\{u[x,y] \to c_1\left[\mathrm{Log}\left[\frac{(-1)^{2/5}(5x^2-y^2)^{3/5}}{y^{1/5}}\right]\right]\right\},$$

$$\left\{u[x,y] \to c_1\left[\mathrm{Log}\left[-\frac{(-1)^{3/5}(5x^2-y^2)^{3/5}}{y^{1/5}}\right]\right]\right\},$$

$$\left.\left\{u[x,y] \to c_1\left[\mathrm{Log}\left[\frac{(-1)^{4/5}(5x^2-y^2)^{3/5}}{y^{1/5}}\right]\right]\right\}\right\}$$