Symbolic computation

float แสดงผลการคำนวณเป็นตัวเลข

$$\frac{\frac{25}{4}+\frac{12}{5}}{\frac{7}{9}}\ \text{float}, 10 \ \rightarrow 11.12142857$$

$$\frac{\frac{25}{4}+\frac{12}{5}}{\frac{7}{9}} = 11.121$$

$$\frac{\frac{25}{4}+\frac{12}{5}}{\frac{7}{9}} \rightarrow \frac{1557}{140}$$

complex แสดงผลการคำนวณเป็นจำนวนเชิงซ้อน

$$\frac{\frac{25}{4}+\frac{12\cdot i}{5}}{\frac{7}{9}} = 8.036 + 3.086i$$

$$\frac{\frac{25}{4}+\frac{12\cdot i}{5}}{\frac{7}{9}} \text{ complex} \rightarrow \frac{225}{28}+\frac{108}{35}\cdot i$$

$$\frac{\frac{25}{4}+\frac{12\cdot i}{5}}{\frac{7}{9}} \rightarrow \frac{225}{28}+\frac{108}{35}\cdot i$$

$$(-1)^{\frac{1}{4}} = 0.707 + 0.707i \qquad (-1)^{\frac{1}{4}} \rightarrow (-1)^{\frac{1}{4}} \qquad (-1)^{\frac{1}{4}} \text{ complex} \rightarrow \frac{1}{2}\cdot 2^{\frac{1}{2}}+\frac{1}{2}\cdot i\cdot 2^{\frac{1}{2}}$$

$$e^{\frac{\pi}{3}\cdot i} = 0.5 + 0.866i \qquad e^{\frac{\pi}{3}\cdot i} \rightarrow \frac{1}{2}+\frac{1}{2}\cdot i\cdot 3^{\frac{1}{2}}$$

$$\left(e^{\frac{\pi}{8}\cdot i}\right)\cdot\left(e^{\frac{\pi}{8}\cdot i}\right) \text{ complex} \rightarrow \frac{1}{2}\cdot 2^{\frac{1}{2}}+\frac{1}{2}\cdot i\cdot\left(2+2^{\frac{1}{2}}\right)^{\frac{1}{2}}\cdot\left(2-2^{\frac{1}{2}}\right)^{\frac{1}{2}}$$

$$\left(e^{\frac{\pi}{8}\cdot i}\right)\cdot\left(e^{\frac{\pi}{8}\cdot i}\right) = 0.707 + 0.707i \qquad \left(e^{\frac{\pi}{8}\cdot i}\right)\cdot\left(e^{\frac{\pi}{8}\cdot i}\right) \rightarrow \exp\left(\frac{1}{8}\cdot i\cdot\pi\right)^2$$

$$\left(e^{\frac{\pi}{8}\cdot i}\right)\cdot\left(e^{\frac{\pi}{8}\cdot i}\right) \text{ float}, 8 \rightarrow .70710677 + .70710679\cdot i$$

solve แสดงผลเฉลยของสมการ

$$2\cdot x + 5 \text{ solve}, x \rightarrow \frac{-5}{2}$$

$$x^2 - 2 \text{ solve}, x \rightarrow \begin{pmatrix} 2^{\frac{1}{2}} \\ -2^{\frac{1}{2}} \end{pmatrix}$$

$$a\cdot x^2 + b\cdot x + c \text{ solve}, x \rightarrow \begin{bmatrix} \frac{1}{2\cdot a}\cdot\left[-b + \left(b^2 - 4\cdot a\cdot c\right)^{\frac{1}{2}}\right] \\ \frac{1}{2\cdot a}\cdot\left[-b - \left(b^2 - 4\cdot a\cdot c\right)^{\frac{1}{2}}\right] \end{bmatrix}$$

$$\text{solve}\left(a\cdot x^2 + b\cdot x + c, x\right) \rightarrow \begin{bmatrix} \frac{1}{2\cdot a}\cdot\left[-b + \left(b^2 - 4\cdot a\cdot c\right)^{\frac{1}{2}}\right] \\ \frac{1}{2\cdot a}\cdot\left[-b - \left(b^2 - 4\cdot a\cdot c\right)^{\frac{1}{2}}\right] \end{bmatrix}$$

$$x^3 - 1 \text{ solve}, x \rightarrow \begin{pmatrix} 1 \\ \frac{-1}{2} + \frac{1}{2}\cdot i\cdot 3^{\frac{1}{2}} \\ \frac{-1}{2} - \frac{1}{2}\cdot i\cdot 3^{\frac{1}{2}} \end{pmatrix}$$

$$\text{solve}\left(\frac{x^2}{4} + \frac{y^2}{9} - 1, y\right) \rightarrow \begin{bmatrix} \frac{3}{2}\cdot\left(-x^2 + 4\right)^{\frac{1}{2}} \\ \frac{-3}{2}\cdot\left(-x^2 + 4\right)^{\frac{1}{2}} \end{bmatrix}$$

simplify ทำการจัดรูปพีชคณิต

$$\left(\frac{4}{5}+\frac{3}{5}\cdot i\right)^4 \text{ simplify} \rightarrow \frac{-527}{625}+\frac{336}{625}\cdot i$$

$$(x+1)\cdot\left(x-\frac{1}{4}\right) \text{ simplify} \rightarrow \frac{1}{4}\cdot(x+1)\cdot(4\cdot x-1)$$

$$\left(e^{\frac{\pi}{8}\cdot i}\right)\cdot\left(e^{\frac{\pi}{8}\cdot i}\right) \text{ simplify} \rightarrow \frac{1}{2}\cdot 2^{\frac{1}{2}}+\frac{1}{2}\cdot i\cdot 2^{\frac{1}{2}}$$

$$\text{simplify}\left[(x+1)\cdot\left(x-\frac{1}{4}\right)\right] \rightarrow \frac{1}{4}\cdot(x+1)\cdot(4\cdot x-1)$$

$$\frac{3}{19}+\frac{47}{93} \text{ simplify} \rightarrow \frac{1172}{1767}$$

$$\frac{3}{19.0}+\frac{47}{93} \text{ simplify} \rightarrow .66327108092812676854$$

substitute ทำแทนค่าตัวแปรในสูตรคณิตศาสตร์

$$x^2 + 2\cdot x\cdot y + y^2 \text{ substitute, } x = 4 \rightarrow 16 + 8\cdot y + y^2$$

$$x^2 + 2\cdot x\cdot y + y^2 \text{ substitute, } y = 1 \rightarrow x^2 + 2\cdot x + 1$$

$$x^2 + 2\cdot x\cdot y + y^2 \text{ substitute, } x = \sin(t) \rightarrow \sin(t)^2 + 2\cdot\sin(t)\cdot y + y^2$$

$$\frac{\frac{25}{4} + \frac{12\cdot x}{5}}{\frac{7}{9}} \text{ substitute, } x = 1 \rightarrow \frac{1557}{140}$$

$$\frac{\frac{25}{4} + \frac{12\cdot x}{5}}{\frac{7}{9}} \text{ substitute, } x = \sin(t) \rightarrow \frac{225}{28} + \frac{108}{35}\cdot\sin(t)$$

factor แยกตัวประกอบ ตัวแปร และ ตัวเลข

$x^3 + 3\cdot x^2\cdot y^2 + 3\cdot x\cdot y^4 + y^6 \text{ factor} \rightarrow (x + y^2)^3$

$x^2 - 4\cdot x - 12 \text{ factor} \rightarrow (x + 2)\cdot(x - 6)$

$(x + y^2)^2 \text{ expand} \rightarrow x^2 + 2\cdot x\cdot y^2 + y^4$

$\text{expand}\left[(x + y^2)^2\right] \rightarrow x^2 + 2\cdot x\cdot y^2 + y^4$

$(x + y^2\cdot t)^2 \text{ expand} \rightarrow x^2 + 2\cdot x\cdot y^2\cdot t + y^4\cdot t^2$

$\cos(5\cdot x) \text{ expand} \rightarrow 16\cdot\cos(x)^5 - 20\cdot\cos(x)^3 + 5\cdot\cos(x)$

$(x + y^2\cdot t)^2 \text{ expand} \rightarrow x^2 + 2\cdot x\cdot y^2\cdot t + y^4\cdot t^2 \left|\begin{array}{l}\text{substitute, } x = 1\\ \text{substitute, } y = 1\end{array}\right. \rightarrow 1 + 2\cdot t + t^2$

$10! \text{ factor} \rightarrow 2^8\cdot 3^4\cdot 5^2\cdot 7$

coeffs ช่วยหาสัมประสิทธิ์ของตัวแปรในพหุนาม

$$2 + 3\cdot x \text{ coeffs}, x \rightarrow \begin{pmatrix} 2 \\ 3 \end{pmatrix}$$

$$(2 + 3\cdot x)^2 \text{ coeffs}, x \rightarrow \begin{pmatrix} 4 \\ 12 \\ 9 \end{pmatrix}$$

$$x^3 + 3\cdot x^2\cdot y^2 + 3\cdot x\cdot y^4 + y^6 \text{ coeffs}, x \rightarrow \begin{pmatrix} y^6 \\ 3\cdot y^4 \\ 3\cdot y^2 \\ 1 \end{pmatrix}$$

$$(\sin(x) + 3\cdot\cos(x))^2 \text{ expand} \rightarrow \sin(x)^2 + 6\cdot\sin(x)\cdot\cos(x) + 9\cdot\cos(x)^2$$

$$(\sin(x) + 3\cdot\cos(x))^2 \text{ coeffs}, \sin(x) \rightarrow \begin{pmatrix} 9\cdot\cos(x)^2 \\ 6\cdot\cos(x) \\ 1 \end{pmatrix}$$

$$(\sin(x) + 3\cdot\cos(x))^2 \text{ coeffs}, \cos(x) \rightarrow \begin{pmatrix} \sin(x)^2 \\ 6\cdot\sin(x) \\ 9 \end{pmatrix}$$

collect กระจายสูตรเป็นพหุนาม

$(x + 2\cdot y + 3\cdot z)^2 \text{ collect, } x \rightarrow x^2 + (4\cdot y + 6\cdot z)\cdot x + (2\cdot y + 3\cdot z)^2$

$(x + 2\cdot y + 3\cdot z)^2 \text{ collect, } y \rightarrow 4\cdot y^2 + (4\cdot x + 12\cdot z)\cdot y + (x + 3\cdot z)^2$

$(x + 2\cdot y + 3\cdot z)^2 \text{ collect, } z \rightarrow 9\cdot z^2 + (6\cdot x + 12\cdot y)\cdot z + (x + 2\cdot y)^2$

$(x + 2\cdot y + 3\cdot z)^2 \text{ expand} \rightarrow x^2 + 4\cdot x\cdot y + 6\cdot x\cdot z + 4\cdot y^2 + 12\cdot y\cdot z + 9\cdot z^2$

series หาอนุกรมเทย์เลอร์ของฟังก์ชัน

$$e^x \text{ series}, x \rightarrow 1 + 1\cdot x + \frac{1}{2}\cdot x^2 + \frac{1}{6}\cdot x^3 + \frac{1}{24}\cdot x^4 + \frac{1}{120}\cdot x^5$$

$$e^x \text{ series}, x, 2 \rightarrow 1 + 1\cdot x$$

$$e^x \text{ series}, x, 3 \rightarrow 1 + 1\cdot x + \frac{1}{2}\cdot x^2$$

$$e^x \text{ series}, x, 4 \rightarrow 1 + 1\cdot x + \frac{1}{2}\cdot x^2 + \frac{1}{6}\cdot x^3$$

$$e^x \text{ series}, x, 6 \rightarrow 1 + 1\cdot x + \frac{1}{2}\cdot x^2 + \frac{1}{6}\cdot x^3 + \frac{1}{24}\cdot x^4 + \frac{1}{120}\cdot x^5$$

$$\sin(t) \text{ series}, t \rightarrow 1\cdot t - \frac{1}{6}\cdot t^3 + \frac{1}{120}\cdot t^5$$

$$\sin(t) \text{ series}, t, 1 \rightarrow 0$$

$$\sin(t) \text{ series}, t, 2 \rightarrow 1\cdot t$$

$$\sin(t) \text{ series}, t, 3 \rightarrow 1\cdot t$$

$$\sin(t) \text{ series}, t, 4 \rightarrow 1\cdot t - \frac{1}{6}\cdot t^3$$

$$\sin(t) \text{ series}, t, 5 \rightarrow 1\cdot t - \frac{1}{6}\cdot t^3$$

$$\sin(t) \text{ series}, t, 6 \rightarrow 1\cdot t - \frac{1}{6}\cdot t^3 + \frac{1}{120}\cdot t^5$$

convert,parfrac กระจายพหุนามเป็นผลบวกของเศษส่วนย่อย

$$\frac{x+1}{(x+2)\cdot(x+3)}\ \text{convert, parfrac, x}\ \rightarrow \frac{-1}{(x+2)}+\frac{2}{(x+3)}$$

$$\frac{x^3+1}{(x+2)\cdot(x+3)}\ \text{convert, parfrac, x}\ \rightarrow x-5-\frac{7}{(x+2)}+\frac{26}{(x+3)}$$

$$\frac{x^3+1}{x^2+5\cdot x+6}\ \text{convert, parfrac, x}\ \rightarrow x-5-\frac{7}{(x+2)}+\frac{26}{(x+3)}$$

laplace, invlaplace หาผลการแปลงลาปลาซ และ ผลการแปลงลาปลาซผกผัน

Definition

$$F(s) = \int_0^{\infty} e^{-s\cdot t}\cdot f(t)\,dt$$

$$\int_0^{\infty} e^{-s\cdot t}\cdot t^2\,dt \to \lim_{t\to\infty} \frac{-\left(\exp(-s\cdot t)\cdot s^2\cdot t^2 + 2\cdot s\cdot t\cdot\exp(-s\cdot t) + 2\cdot\exp(-s\cdot t)\right)}{s^3} + \frac{2}{s^3}$$

$$t^2 \text{ laplace}, t \to \frac{2}{s^3}$$

$$\frac{2}{s^3} \text{ invlaplace}, s \to t^2$$