

＜代数計算・因数分解＞

★代数計算

☆基本演算

$$\frac{x^2-5x+6}{x^2+5x+4} \div \frac{x^2-4x+3}{2x^2+3x+1} \times \frac{x^2+3x-4}{2x^2-3x-2} = 1 \qquad \frac{a+2}{a-\frac{2}{a+1}} = 1 + \frac{2}{a-1}$$

$$(\cos y + \sin x)^2 = \cos^2 y + 2\cos y \sin x + \sin^2 x \qquad (a_1 + 2a_2 + 1)(a_1 - 3a_2 + 1) = a_1^2 - a_1 a_2 + 2a_1 - 6a_2^2 - a_2 + 1$$

☆行列・行列式・ベクトル

$$\begin{pmatrix} a & b \\ c & d \end{pmatrix}^{-1} = \frac{1}{-bc+ad} \begin{pmatrix} d & -b \\ -c & a \end{pmatrix} \qquad \begin{pmatrix} a_1 & b_1 \\ c_1 & d_1 \end{pmatrix} \times \begin{pmatrix} a_2 & b_2 \\ c_2 & d_2 \end{pmatrix} = \begin{pmatrix} a_1 a_2 + b_1 c_2 & a_1 b_2 + b_1 d_2 \\ a_2 c_1 + c_2 d_1 & b_2 c_1 + d_1 d_2 \end{pmatrix} \qquad \begin{vmatrix} a & b \\ c & d \end{vmatrix} + 2 = ad - bc + 2$$

$$(a_1, b_1, c_1) \cdot (a_2, b_2, c_2) = a_1 a_2 + b_1 b_2 + c_1 c_2 \qquad (a_1, b_1, c_1) \times (a_2, b_2, c_2) = (b_1 c_2 - b_2 c_1, -a_1 c_2 + a_2 c_1, a_1 b_2 - a_2 b_1)$$

☆シグマ関数の展開

$$\sum_{k=1}^9 \frac{1}{k(k+1)} = \frac{1}{(1+1)} + \frac{1}{2(1+2)} + \frac{1}{3(1+3)} + \frac{1}{4(1+4)} + \frac{1}{5(1+5)} + \frac{1}{6(1+6)} + \frac{1}{7(1+7)} + \frac{1}{8(1+8)} + \frac{1}{9(1+9)}$$

☆多変数最大公約数 (GCD)

$$\begin{aligned} &\text{gcd}(2000376a^5x^2-1746360a^5x+381024a^5-5000940a^4bx^3-4365900a^4bx^2+6670440a^4bx-1663200a^4b \\ &+21829500a^3b^2x^3-4765950a^3b^2x^2-8318750a^3b^2x+2722200a^3b^2-35728875a^2b^3x^3+20796875a^2b^3x^2 \\ &+2269500a^2b^3x-1980000a^2b^3+25987500ab^4x^3-19852500ab^4x^2+2475000ab^4x+540000ab^4 \\ &-7087500b^5x^3+6187500b^5x^2-1350000b^5x,-7087500b^5x^3+6187500b^5x^2-1350000b^5x) \\ &=63x^2-55x+12 \end{aligned}$$

プロフェッショナル版限定機能

★因数分解

$$a^3(b-c)+b^3(c-a)+c^3(a-b) = (a-c)(b-c)(a-b)(a+b+c)$$

$$x^8+2x^7+7x^6+16x^5-x^4+10x^3-35x^2-100x+100 = (x-1)^2(x+2)^2(x^2+5)^2$$

$$\frac{1}{4}x^2 - \frac{1}{3}xy + \frac{1}{9}y^2 = \frac{1}{36}(3x-2y)^2 \qquad \sin^2 x + 2\sin x \cos y + \cos^2 y = (\cos y + \sin x)^2 \quad \text{システム関数を含んだ式}$$

$$(a_1 + a_2 + 1)(a_1 - 2a_2 + 1) - 4a_2^2 = (a_1 + 2a_2 + 1)(a_1 - 3a_2 + 1)$$

$$\begin{aligned} &x^6+4ux^4+4yzx^4+2u^3x^3+3u^2x^3+2w^3x^3+3wyzx^3+2y^3x^3+2z^3x^3+4u^4x+12u^3x+4u^3yzx+12u^2yzx+4uw^3x+12uwyxz \\ &+4uy^3x+4uz^3x+4w^3yzx+12wy^2z^2x+4y^4zx+4yz^4x+u^6+3u^5+2u^3w^3+3u^3wyz+2u^3y^3+2u^3z^3+3u^2w^3+3u^2y^3+3u^2z^3 \\ &+w^6+3w^4yz+2w^3y^3+2w^3z^3+3wy^4z+3wyz^4+y^6+2y^3z^3+z^6 \\ &=(x^3+u^3+3u^2+w^3+3wyz+y^3+z^3)(x^3+4ux+4yzx+u^3+w^3+y^3+z^3) \end{aligned}$$

プロフェッショナル版限定機能

★式番号を用いた等式操作

$$x^4+y^4=(x^2\sin^2\theta+y^2\cos^2\theta) \qquad (1) \qquad \text{式番号(1)の式}$$

$$\sqrt{(1)} \quad \text{を代数計算すると} \rightarrow \sqrt{x^4+y^4} = \sqrt{x^2\sin^2\theta+y^2\cos^2\theta}$$

$$e^{(1)} \quad \text{を代数計算すると} \rightarrow e^{x^4+y^4} = e^{x^2\sin^2\theta+y^2\cos^2\theta}$$

$$2x+5y=12 \qquad (2) \qquad \text{式番号(2)の式}$$

$$7x-3y=24 \qquad (3) \qquad \text{式番号(3)の式}$$

$$7 \times (2) - 2 \times (3) \quad \text{を代数計算すると} \rightarrow 41y = 36 \qquad x \text{が消去されます}$$