

In[93]:= sol = Solve[z^6 == 1, z]
[解く]

Out[93]:= {{z -> -1}, {z -> 1}, {z -> -(-1)^(1/3)}, {z -> (-1)^(1/3)}, {z -> -(-1)^(2/3)}, {z -> (-1)^(2/3)}}

In[94]:= ? ComplexExpand

ComplexExpand[expr] すべての変数が実数であるとみなして、式 expr を展開する。
ComplexExpand[expr, {x1, x2, ...}] xi に適合する変数を複素数とみなして式 expr を展開する。 >>

In[95]:= ComplexExpand[sol]
[式の展開]

Out[95]:= {{z -> -1}, {z -> 1}, {z -> - $\frac{1}{2} - \frac{i\sqrt{3}}{2}$ },
{z -> $\frac{1}{2} + \frac{i\sqrt{3}}{2}$ }, {z -> $\frac{1}{2} - \frac{i\sqrt{3}}{2}$ }, {z -> - $\frac{1}{2} + \frac{i\sqrt{3}}{2}$ }}

In[96]:= f[z_] := z^3

In[97]:= ComplexExpand[f[x + I y]]
[式の展開] [虚数単位]

Out[97]:= x^3 - 3 x y^2 + i (3 x^2 y - y^3)

In[98]:= u[x_, y_] := ComplexExpand[Re[f[x + I y]]]
[式の展開] [実部] [虚数単位]

In[99]:= v[x_, y_] := ComplexExpand[Im[f[x + I y]]]
[式の展開] [複素数...] [虚数単位]

In[100]:= {u[x, y], v[x, y]}

Out[100]:= {x^3 - 3 x y^2, 3 x^2 y - y^3}

In[101]:= {D[u[x, y], x], D[u[x, y], y], D[v[x, y], x], D[v[x, y], y]}
[微分係数] [微分係数] [微分係数] [微分係数]

Out[101]:= {3 x^2 - 3 y^2, -6 x y, 6 x y, 3 x^2 - 3 y^2}

In[102]:= f[z_] := 1/z^2

In[103]:= u[x_, y_] := ComplexExpand[Re[f[x + I y]]]
[式の展開] [実部] [虚数単位]

In[104]:= v[x_, y_] := ComplexExpand[Im[f[x + I y]]]
[式の展開] [複素数...] [虚数単位]

In[105]:= {u[x, y], v[x, y]}

Out[105]:= { $\frac{x^2}{(x^2 + y^2)^2} - \frac{y^2}{(x^2 + y^2)^2}$, $-\frac{2 x y}{(x^2 + y^2)^2}$ }

In[106]:= Simplify[{D[u[x, y], x], D[u[x, y], y], D[v[x, y], x], D[v[x, y], y]}]
[簡単な形式に] [微分係数] [微分係数] [微分係数] [微分係数]

Out[106]:= {- $\frac{2(x^3 - 3 x y^2)}{(x^2 + y^2)^3}$, $\frac{-6 x^2 y + 2 y^3}{(x^2 + y^2)^3}$, $-\frac{2 y(-3 x^2 + y^2)}{(x^2 + y^2)^3}$, $-\frac{2 x(x^2 - 3 y^2)}{(x^2 + y^2)^3}$ }

In[107]:= **Factor[%]**

[因数分解]

$$\text{Out[107]} = \left\{ -\frac{2x(x^2 - 3y^2)}{(x^2 + y^2)^3}, -\frac{2y(3x^2 - y^2)}{(x^2 + y^2)^3}, -\frac{2y(-3x^2 + y^2)}{(x^2 + y^2)^3}, -\frac{2x(x^2 - 3y^2)}{(x^2 + y^2)^3} \right\}$$

In[108]:= **f[z_] := (Exp[z] + Exp[-z]) / 2**

[指数関数] [指数関数]

In[109]:= **u[x_, y_] := ComplexExpand[Re[f[x + I y]]]**

[式の展開]

[実部]

[虚数単位]

v[x_, y_] := ComplexExpand[Im[f[x + I y]]]

[式の展開]

[複素数…]

[虚数単位]

In[111]:= **{u[x, y], v[x, y]}**

$$\text{Out[111]} = \left\{ \frac{1}{2} e^{-x} \cos[y] + \frac{1}{2} e^x \cos[y], -\frac{1}{2} e^{-x} \sin[y] + \frac{1}{2} e^x \sin[y] \right\}$$

In[112]:= **{D[u[x, y], x], D[u[x, y], y], D[v[x, y], x], D[v[x, y], y]}**

[微分係数]

[微分係数]

[微分係数]

[微分係数]

$$\text{Out[112]} = \left\{ -\frac{1}{2} e^{-x} \cos[y] + \frac{1}{2} e^x \cos[y], -\frac{1}{2} e^{-x} \sin[y] - \frac{1}{2} e^x \sin[y], \right. \\ \left. \frac{1}{2} e^{-x} \sin[y] + \frac{1}{2} e^x \sin[y], -\frac{1}{2} e^{-x} \cos[y] + \frac{1}{2} e^x \cos[y] \right\}$$

In[113]:=