>

実習17.2

> $f := (x,y) \to (x^2+y^2)^2 - 2\cdot x^2 + 2\cdot y^2$

$$f := (x,y) \mapsto (x^2+y^2)^2 - 2x^2 + 2y^2 \quad (1)$$

> $solve(\{diff(f(x,y),x)=0, diff(f(x,y),y)=0\}, \{x,y\})$

$$\{x=0, y=0\}, \{x=0, y=RootOf(_Z^2+1)\}, \{x=1, y=0\}, \{x=-1, y=0\} \quad (2)$$

> $evalf(\%)$

$$\{x=0., y=0.\}, \{x=0., y=I\}, \{x=1., y=0.\}, \{x=-1., y=0.\} \quad (3)$$

> $det(H) := diff(f(x,y),x,x)\cdot diff(f(x,y),y,y) - diff(f(x,y),x,y)^2$

$$det := H \mapsto \left(\frac{\partial^2}{\partial x^2} f(x,y)\right)\left(\frac{\partial^2}{\partial y^2} f(x,y)\right) - \left(\frac{\partial^2}{\partial x \partial y} f(x,y)\right)^2 \quad (4)$$

> $subs(x=0, y=0, det(H))$

$$-16 \quad (5)$$

> $subs(x=1, y=0, det(H))$

$$64 \quad (6)$$

> $subs(x=1, y=0, diff(f(x,y),x,x))$

$$8 \quad (7)$$

> $subs(x=-1, y=0, det(H))$

$$64 \quad (8)$$

> $subs(x=-1, y=0, diff(f(x,y),x,x))$

$$8 \quad (9)$$

> $f(1,0)$

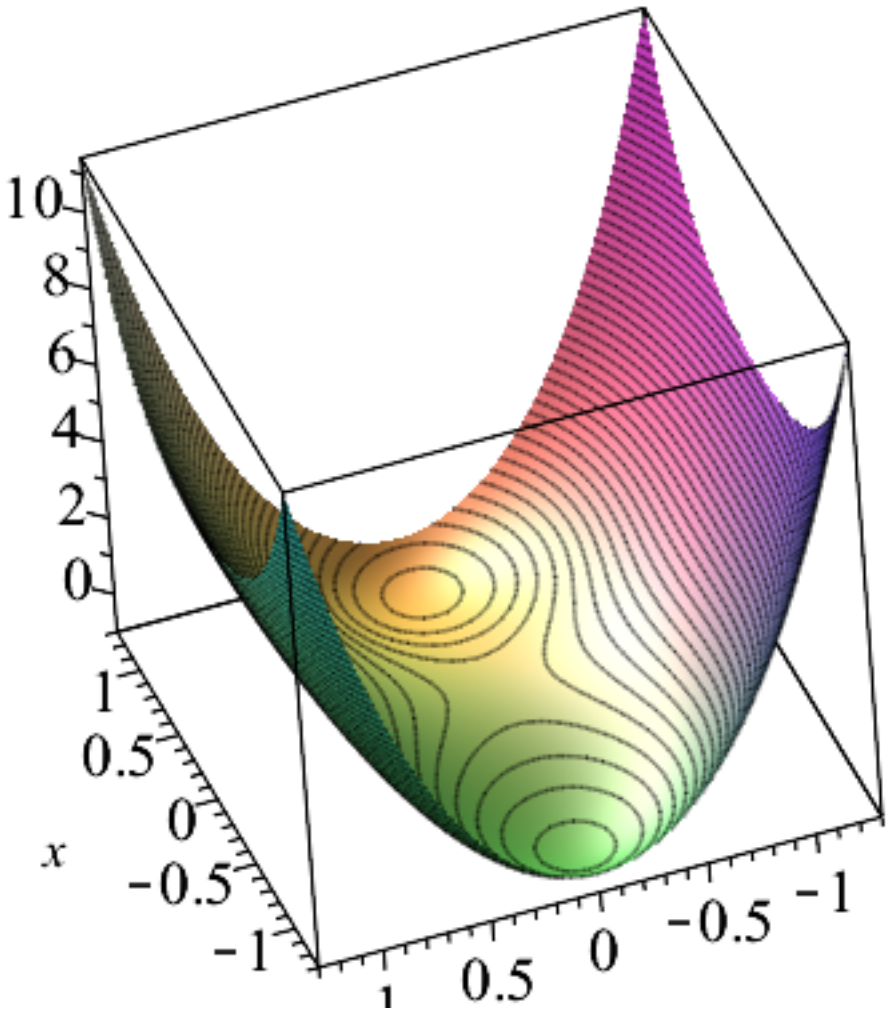
$$-1 \quad (10)$$

> $f(-1,0)$

$$-1 \quad (11)$$

極大値 なし
極小値 f(1,0)=f(-1,0)-1

> $plot3d(f(x,y), x=-1.3..1.3, y=-1.3..1.3, style=patchcontour, contours=50)$


10
8
6
4
2
0
1
0.5
0
-0.5
-1
x
1
0.5
0
-0.5
-1