

>

実習17.3

$$\begin{aligned}> f := (x, y) \rightarrow \exp(-x^2 - y^2) \cdot (2 \cdot x^2 + y^2) \\&\quad f := (x, y) \mapsto e^{-x^2 - y^2} (2x^2 + y^2)\end{aligned}\tag{1}$$

(1)

$$\begin{aligned}> solve(\{diff(f(x, y), x) = 0, diff(f(x, y), y) = 0\}, \{x, y\}) \\&\quad \{x=0, y=0\}, \{x=1, y=0\}, \{x=-1, y=0\}, \{x=0, y=1\}, \{x=0, y=-1\}\end{aligned}\tag{2}$$

(2)

$$\begin{aligned}> det(H) := diff(f(x, y), x, x) \cdot diff(f(x, y), y, y) - diff(f(x, y)x, y)^2 \\&\quad det := H \mapsto \left(\frac{\partial^2}{\partial x^2} f(x, y) \right) \left(\frac{\partial^2}{\partial y^2} f(x, y) \right) - \left(\frac{\partial}{\partial y} (f(x, y)x) \right)^2\end{aligned}\tag{3}$$

$$\begin{aligned}> subs(x=0, y=0, det(H)) \\&\quad 8(e^0)^2\end{aligned}\tag{4}$$

$$\begin{aligned}> subs(x=0, y=0, diff(f(x, y), x, x)) \\&\quad 4e^0\end{aligned}\tag{5}$$

$$\begin{aligned}> subs(x=1, y=0, det(H)) \\&\quad 16(e^{-1})^2\end{aligned}\tag{6}$$

$$\begin{aligned}> subs(x=1, y=0, diff(f(x, y), x, x)) \\&\quad -8e^{-1}\end{aligned}\tag{7}$$

$$\begin{aligned}> subs(x=-1, y=0, det(H)) \\&\quad 16(e^{-1})^2\end{aligned}\tag{8}$$

$$\begin{aligned}> subs(x=-1, y=0, diff(f(x, y), x, x)) \\&\quad -8e^{-1}\end{aligned}\tag{9}$$

$$\begin{aligned}> subs(x=0, y=1, det(H)) \\&\quad -8(e^{-1})^2\end{aligned}\tag{10}$$

$$\begin{aligned}> subs(x=0, y=-1, det(H)) \\&\quad -8(e^{-1})^2\end{aligned}\tag{11}$$

$$\begin{aligned}> f(0, 0) \\&\quad 0\end{aligned}\tag{12}$$

$$\begin{aligned}> f(1, 0) \\&\quad 2e^{-1}\end{aligned}\tag{13}$$

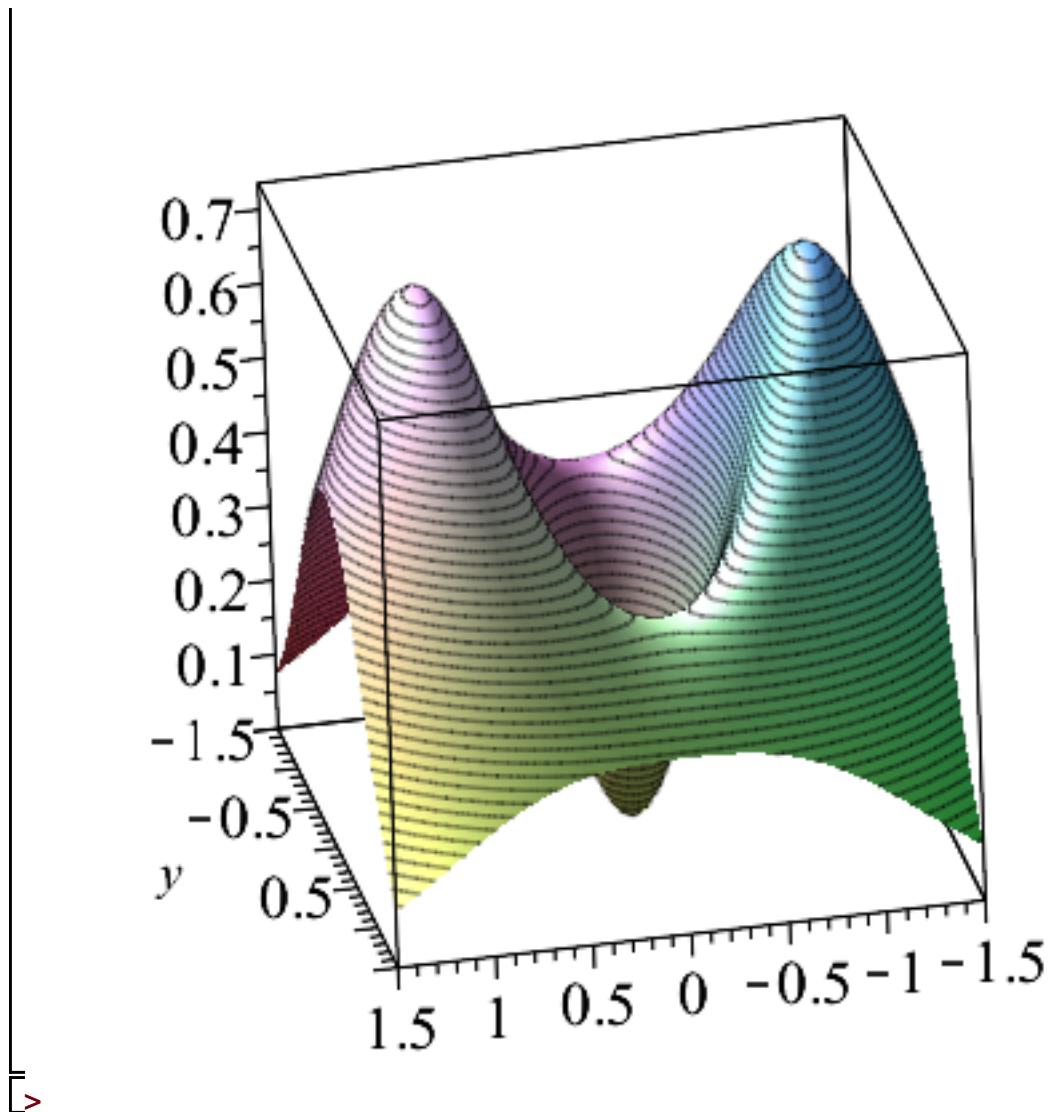
$$\begin{aligned}> f(-1, 0) \\&\quad 2e^{-1}\end{aligned}\tag{14}$$

極大値 $f(1, 0) = f(-1, 0) = 2/e$ 極小値 $f(0, 0) = 0$

>

(3)

$$> plot3d(f(x, y), x=-1.5..1.5, y=-1.5..1.5, style=patchcontour, contours=50)$$



▶