



1.  $f(x, y) = x^3 + 3xy + y^3$

$$f_x = 3x^2 + 3y = 0$$

$$f_y = 3x + 3y^2 = 0$$

$$\left. \begin{array}{l} f_x = 3x^2 + 3y = 0 \\ f_y = 3x + 3y^2 = 0 \end{array} \right\} \Rightarrow (x, y) = \underline{(0, 0), (-1, -1)}$$

停留点,

$$\Delta(a, b) \stackrel{\text{def}}{=} f_{xy}(a, b)^2 - f_{xx}(a, b) f_{yy}(a, b)$$

$$\Delta(0, 0) = f_{xy}(0, 0)^2 - f_{xx}(0, 0) f_{yy}(0, 0)$$

$$= 9 - 0 = 9 > 0. \quad \therefore (0, 0) \text{ は極値点で}$$

(8761).

$$\Delta(-1, -1) = f_{xy}(-1, -1)^2 - f_{xx}(-1, -1) f_{yy}(-1, -1)$$

$$= 9 - (-6)(-6) = -27 < 0$$

$$f_{xx}(-1, -1) = -6 < 0 \quad \therefore (-1, -1) \text{ は極大点,}$$

$$f(-1, -1) = -1 + 3 - 1 = 1 \quad \text{は極大値.}$$

2.

$$\int_0^{1/2} \left( \int_0^y f(x, y) dx \right) dy + \int_{1/2}^1 \left( \int_0^{1-y} f(x, y) dx \right) dy$$