

2005年度 微積分学II 演習問題(3)

1. 次の関数と θ について, $(x, y) = (0, 0)$ における θ 方向への方向微分可能性を調べよ。

$$(1) f(x, y) = \frac{xy}{x^2 + y^2}, f(0, 0) = 0, \theta = \frac{\pi}{4}$$

$$(2) f(x, y) = \frac{xy^2}{x^2 + y^2}, f(0, 0) = 0, \theta = \frac{\pi}{4}$$

$$(3) f(x, y) = \frac{x^2y^2}{(x^2 + y^2)^{\frac{3}{2}}}, f(0, 0) = 0, \theta = \frac{\pi}{4}$$

$$(4) f(x, y) = \frac{x^2y^2}{(x^2 + y^2)^{\frac{3}{2}}}, f(0, 0) = 0, \theta = \frac{\pi}{3}$$

$$(5) f(x, y) = \frac{x^2y^2}{(x^2 + y^2)^{\frac{3}{2}}}, f(0, 0) = 0, \theta = \frac{5\pi}{6}$$

2. 次の関数の2階偏導関数を求めよ。

$$(1) f(x, y) = x^3 + 2x^2y - y^3 + 3x + 5y$$

$$(2) f(x, y) = x^5 + 2x^3y^2 + xy^3$$

$$(3) f(x, y) = \frac{x^2 + y^2}{x + y}$$

$$(4) f(x, y) = x^3 \sin y$$

$$(5) f(x, y) = \sin(2x + 3y)$$

$$(6) f(x, y) = e^x \cos y$$

$$(7) f(x, y) = e^{x^2+y^2}$$

$$(8) f(x, y) = \sqrt{x^2 + y^2}$$

$$(9) f(x, y) = \log(x^2 + y^2)$$

$$(10) f(x, y) = x^y$$