

CALCULUS
FUNCTIONS OF SEVERAL VARIABLES, ADDITIONAL EXERCISES NO.9

1. DOMAIN OF FUNCTIONS IN TWO VARIABLES

(1) Find the domain of the given functions:

$$f(x, y) = \frac{5x + 2y}{4x + 3y} \quad (1.1)$$

$$f(x, y) = \sqrt{9 - x^2 - y^2} \quad (1.2)$$

$$f(x, y) = \sqrt{x^2 - y} \quad (1.3)$$

$$f(x, y) = \frac{x}{\log x + y} \quad (1.4)$$

$$f(x, y) = \log(x + y - 4) \quad (1.5)$$

$$f(x, y) = \frac{e^{xy}}{\sqrt{x - 2y}} \quad (1.6)$$

(2) Sketch the indicated level curve $f(x, y) = C$ for each of the constant C

$$f(x, y) = x + 2y; \ C = 1, C = 2, C = 3 \quad (1.7)$$

$$f(x, y) = x^2 + y; \ C = 0, C = 4, C = 9 \quad (1.8)$$

$$f(x, y) = x^2 - 4x - y; \ C = -4, C = 5 \quad (1.9)$$

$$f(x, y) = x/y; \ C = -2, C = 2 \quad (1.10)$$

$$f(x, y) = xy; \ C = 1, C = -1, C = 2, C = -2 \quad (1.11)$$

$$f(x, y) = xe^y; \ C = 1, C = e \quad (1.12)$$

(3) Compute the indicated function value.

$$f(x, y) = 5x + 3y; \quad f(-1, 2), f(3, 0) \quad (1.13)$$

$$f(x, y) = \frac{3x + 2y}{2x + 3y}; \quad f(1, 2), f(-4, 6) \quad (1.14)$$

$$f(x, y) = \sqrt{y^2 - x^2}; \quad f(4, 5), f(-1, 2) \quad (1.15)$$

(4) Find all first-order partial derivatives of the given function

$$f(x, y) = 7x - 3y + 4 \quad (1.16)$$

$$f(x, y) = x - xy + 3 \quad (1.17)$$

$$f(x, y) = 2x(y - 3x) - 4y \quad (1.18)$$

$$f(x, y) = 2xy^5 + 3x^2y + x^2 \quad (1.19)$$

$$f(x, y) = (x + xy + y)^3 \quad (1.20)$$

$$f(x, y) = xye^x \quad (1.21)$$

$$f(x, y) = \frac{2x + 3y}{y - x} \quad (1.22)$$

$$f(x, y) = \frac{xy^2}{x^2y^3 + 1} \quad (1.23)$$

$$f(x, y) = x \log(y) \quad (1.24)$$

$$f(x, y) = xe^{xy} \quad (1.25)$$