

CALCULUS
GLOBAL GOVERNANCE
A.Y. 2025/26

Recitation VII

Exercise 1 (Domains of functions of 2 variables)

Find the domain of the following functions:

$$(a) \quad f(x, y) = \frac{5x + 2y}{4x + 3y} \quad (b) \quad g(x, y) = \sqrt{9 - x^2 - y^2} \quad (c) \quad h(x, y) = \frac{e^{xy}}{\sqrt{x - 2y}}$$

Exercise 2 (Level curves)

For each of the following functions, sketch the level curve $f(x, y) = C$ for each of the indicated values of the constant C .

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

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

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

Exercise 3 (Partial derivatives)

Find all first-order partial derivatives of the following functions:

$$(a) \quad f(x, y) = 7x - 3y + 4, \quad (b) \quad f(x, y) = 2xy^5 + 3x^2y + x^2, \quad (c) \quad f(x, y) = xe^{xy}$$

Exercise 4 (Word problem)

A certain employee processes

$$A(r, s) = 0.1r^{3/4}s^{1/2},$$

program applications per month, where r is the number of hours spent reviewing documents and s is the number of hours spent assisting applicants with the process.

- (1) Suppose they currently spend 100 hours on review and 40 on assistance. If they have a little more time available, which task should they spend more time on to get the biggest improvement?

- (2) How much more time would they have to add to that task before the answer would change?