

微積分作業8

May 22, 2026

- 1 Find the directional derivative of the function at P in the direction of the unit vector $\mathbf{u} = \cos \theta \mathbf{i} + \sin \theta \mathbf{j}$.

$$f(x, y) = \frac{y}{x + y}, \quad P(3, 0), \quad \theta = \frac{\pi}{6}$$

- 2 Find a unit normal vector to the surface at the given point.

$$\text{Surface : } x^2y^3 - y^2z + 2xz^3 = 4 \text{ Point : } (-1, 1, -1)$$

[Hint: Normalize the gradient vector $\nabla F(x, y, z)$.]

- 3 Find all relative extrema and saddle points of the function. Use the Second Partial Test where applicable.

$$z = -5x^2 + 4xy - y^2 + 16x + 10$$