

Unit 2: Derivatives

Part 5

Bionic Who

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1 Problem 1

Consider the function $f(x, y) = x^3 - 3xy + y^3$.

- (a) Find all the critical points of f .
- (b) Use the Second Derivative Test to classify each critical point as a local maximum, local minimum, or saddle point.

2 Problem 2

Given the function $g(x, y) = x^2y - 2x^2 - y^2$,

- (a) Find the critical points of g .
- (b) Classify each critical point using the Second Derivative Test.

3 Problem 3

Find the local maximum, local minimum, and saddle points of the function $h(x, y) = x^4 + y^4 - 4xy + 1$.

4 Problem 4

A company's profit function is given by $P(x, y) = -x^2 - 2y^2 + 10x + 12y - 50$, where x and y are the quantities of two products produced. Use the Second Derivative Test to determine the values of x and y that maximize the company's profit.