

PROBLEM SET 8

MATH 2019 – SPRING 2008

1. Examine the following functions for relative extrema and saddle points.

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

(b) $f(x, y) = x^3 + 12xy + y^3$

(c) $f(x, y) = 3xy - x^2y - xy^2$

(d) $f(x, y) = x^3 + y^5 + 3x^2 - 9x - 5y - 8$

2. Use Lagrange multipliers to find the critical points of the function subject to the given constraint.

(a) $f(x, y) = x^2 - y^2; \quad x^2 + y^2 = 1$

(b) $f(x, y) = 3xy; \quad 4x^2 + y^2 = 200$

(c) $f(x, y) = 2x^2 + 32y^2; \quad xy = 4$

(d) $f(x, y) = x + 2y - 2; \quad x^2y = 432$

(e) $f(x, y) = x^2y; \quad 4x + 3y = 18$

(f) $f(x, y, z) = 2x + 6y + 10z; \quad x^2 + y^2 + z^2 = 35$

Date: March 26, 2008