

Math2204: Written HW 9 (Due Thursday 4/17, 5pm)

No calculator or other electronic devices for written HWs.

Hand in **ALL WORK AND REASONING** for the following problems.

For all Lagrange multiplier problems: 1. Check if $\nabla g = \mathbf{0}$ on the constraint.

2. Show reasoning why a max and/or min exist or not.

3. Include the formula you use.

■ Section 14.7: 7, 35.

■ Section 14.8: 3.

A) Find local maxima, local minima, and saddle points of $f(x, y) = xy^2 - x^2y + 6x$.

B) Find local maxima, local minima, and saddle points of $f(x, y) = x - y^2$.

C) Find absolute maximum and minimum values of $f(x, y) = x^2 + y^2 - 2x$ on the triangular region with vertices $(0, 0)$, $(2, -2)$, and $(2, 2)$.

D) Find the absolute maximum and minimum values of $f(x, y) = 5x^2 + xy + 3x$ along the curve $y = x^2$ with $-1 \leq x \leq 1$

1. Using substitution of the curve in f (See Sec. 14.7).

2. Using Lagrange multipliers.

E) Let $f(x, y) = x^2 + y^2 + 2x$.

1. Find all local maxima, local minima, and saddle points of f .

2. Find the maximum and minimum of f subject to $2x^2 + y^2 = 4$.

3. Find the absolute maximum and minimum values of f on the region $2x^2 + y^2 \leq 4$.