

Written Homework
Assigned Wednesday, November 13

Note: Standard (not preliminary) written homework is graded on your work and your explanations, not just on your answer.

Explanations are important for many reasons. Being able to communicate what you know shows a depth of understanding beyond that of being able to get the right answer to a problem. Doing the mental work of putting explanations into words helps create that depth of understanding. On exams, we will grade your work and not just your answers, so this is good practice for taking exams.

For all these reasons, be sure to: show all your work; explain your reasoning; use clear English; write neatly so all this effort does not go to waste.

Written homework is always due at 10:00 AM on the following Monday.

Assignment:

1. Find all critical points of the function

$$f(x, y) = y^3 + 6x^2 + 3y^2 - 3x^2y,$$

and classify each of them as a local maximum point, local minimum point, or saddle point.

2. The origin is a critical point of each of the following functions. Show that the second derivative test fails to classify the origin as a local maximum point, local minimum point, or saddle point. Then use whatever you can figure out about the graph of the function to classify the origin.

(a)

$$f(x, y) = x^4 + y^4.$$

(b)

$$f(x, y) = x^4 - x^2y^2.$$

(Hint for (b): What does the intersection of the graph of f with a vertical plane $y = ax$ look like for various values of a ?)