

Instructions

You are encouraged to work with others on this project. As with all writing you should work out the details in draft form before writing a final solution. You should write your solution in paragraph form using complete sentences that incorporate all symbolic mathematical expressions into the grammatical structure. You should include enough detail so that a reader can follow your reasoning and reconstruct your work. You should not show every algebraic or arithmetic step. You should do your own writing of the solution even if you have worked out the details with other people. All graphs should be done carefully on graph paper or using appropriate technology. The project is due at the beginning of class on Tuesday, April 2.

The accompanying plot shows the gradient vector field for a function $f : \mathbb{R}^2 \rightarrow \mathbb{R}$ for inputs (x, y) in $[-10, 10] \times [-10, 10]$.

1. Sketch the level curve that passes through the point $(5, -5)$.
2. Sketch the level curve that passes through the point $(8, 5)$.
3. Sketch the path of steepest ascent starting at the point $(2, 6)$.
4. Estimate the input (x, y) for which the graph of f is steepest.
5. Estimate the coordinates (x, y) of all local minimizers, local maximizers, and “saddlizers.”
6. Describe and/or sketch the graph of f .

Gradient vector field for a function $f : \mathbb{R}^2 \rightarrow \mathbb{R}$

