

Worksheet 4: 9.3-9.4

Exercise 1 (§9.3 # 5) Find all relative extrema of the following functions.

$$f(x, y) = 2x^2 + 3xy + 4y^2 + 7x + 11y$$

$$g(x, y) = \log(2 + x^2 + y^2) \quad h(x, y) = x^2 - 1 + \frac{1}{3}y^3 + y - \sin(y)$$

Exercise 2 (§9.1 # 29) For each extremum in Exercise 1, compute the discriminant and identify the extremum as either a maximum, minimum or saddle point.

Exercise 3 You run a CPU manufacturing company selling two models: a fast CPU and an energy efficient CPU. The total cost of manufacturing x shipments of the fast CPUs and y shipments of efficient CPUs is

$$C(x, y) = 3x^2 + 4y^2 + 2xy + 5$$

The models retail for the same amount, and you can only manufacture 15 total shipments per quarter. How many shipments of the fast CPUs should you manufacture to maximize profit? (Use Lagrange multipliers).