Clex 9: Optimization

Problem 1: Finding and classifying critical points

Find and classify the critical points of the function

$$f(x,y) = \frac{x}{y} + \frac{8}{x} - y$$

Problem 2: Finding and classifying critical points

Find and classify the critical points of the function

$$f(x,y) = x \sin y$$

Problem 3: Constrained optimization

Use the method of lagrange multipliers to find the maximum and minimum values of the function $f(x,y,z) = x+2y-3z$ on the ellipsoid $x^2+4y^2+9z^2 = 108$.