1. Consider the function \( f(x, y) = 2x^2 + y^3 - x - 12y + 4 \).

   (a) Find the partial derivatives \( f_x = \frac{\partial f}{\partial x} \) and \( f_y = \frac{\partial f}{\partial y} \).

   (b) Find all critical points of \( f \).

   (c) Calculate the 2nd derivatives \( f_{xx} = \frac{\partial^2 f}{\partial x^2} \), \( f_{yy} = \frac{\partial^2 f}{\partial y^2} \), and \( f_{xy} = \frac{\partial^2 f}{\partial y \partial x} \).

   (d) Use the discriminant to determine which critical points are relative maxes, relative mins, and saddle points.