

1. Let  $f(x, y) = x^2 - 8x + 2xy - 14y + 4y^2 + 19$ 
  - a. Find the first order partial derivatives  $f_x, f_y$
  - b. Find the second order partial derivatives  $f_{xx}, f_{xy}, f_{yx},$  and  $f_{yy}$
  - c. Evaluate all of the partial derivatives at the point  $(3, 1)$ .
  - d. What does your answer to c. tell you about the graph  $z = f(x, y)$ ?
  
2. Let  $g(x, y) = 2y^2 - 12y - 4yx + 10x + x^2$ 
  - a. Find the first order partial derivatives  $g_x, g_y$
  - b. Find the second order partial derivatives  $g_{xx}, g_{xy}, g_{yx},$  and  $g_{yy}$
  - c. Evaluate all of the partial derivatives at the point  $(-1, 2)$ .
  - d. What does your answer to c. tell you about the graph  $z = g(x, y)$ ?