Assignment 8

1. Find the domain and range of the function.

   (a) $f(x, y) = \sqrt{9 - 6x^2 + y^2}$

   (b) $f(x, y) = \ln(xy - 6)$

2. Describe and sketch the graph of the level surface $f(x, y, z) = c$ at the given value of c.

$$f(x, y, z) = x^2 + \frac{1}{4}y^2 - z \ , \ c = 1$$

3. Use polar coordinates and L'Hopital's rule to find the limit.

$$\lim_{(x,y) \to (0,0)} (x^2 + y^2) \ln(x^2 + y^2)$$

4. Discuss the continuity of the function.

   (a) $f(x, y, z) = \dfrac{\sin z}{e^x + e^y}$

   (b) $f(x, y) = \begin{cases} \dfrac{\sin x^2 + y^2}{x^2 - y^2} & , \ x^2 \neq y^2 \\ 1 & , \ x^2 = y^2 \end{cases}$