Homework 5 (Due Wednesday, June 25)

1. Find and classify the critical points of the function $f = 10x^2y - 5x^2 - 4y^2 - x^4 - 2y^4$. Illustrate your findings with a contour plot.

2. Find the maximum volume of a rectangular box that is inscribed in a sphere of radius r.

3. Find the point on the plane $x - y + z = 4$ that is closest to the point $(1, 2, 3)$.

4. A cardboard box without a lid is to have volume V. Find the dimensions that minimize the amount of cardboard used.