MATHEMATICS 211
ASSIGNMENT 7
Due: October 29, 2014

01° Let f be the function defined as follows:

$$f(x,y) = \frac{1}{3}x^3 + \frac{1}{3}y^3 + (x - \frac{3}{2})^2 - (y+4)^2$$

where (x,y) is any point in $\mathbf{R}^2$. Find the critical points for f. That is, find the points (a,b) for which:

$$f_x(a,b) = 0, \quad f_y(a,b) = 0$$

For each such point (a,b), determine whether it is a local minimum point, a saddle point, or a local maximum point. Of course, a priori, it might be none of the three.

02° Let f be the function defined as follows:

$$f(x,y) = xy(4x^2 + y^2 - 16)$$

where (x,y) is any point in $\mathbf{R}^2$ for which:

$$0 \leq x, \quad 0 \leq y, \quad 4x^2 + y^2 \leq 16$$

Find the global minimum and maximum values for f.

03° Let f be the function defined as follows:

$$f(x,y) = 6xy^2 - 2x^3 - 3y^4$$

where (x,y) is any point in $\mathbf{R}^2$. Find the three critical points for f. For each such point (a,b), determine whether it is a local minimum point, a saddle point, or a local maximum point. For one of the points, you will need to exercise ingenuity.

04° Show that, among all triangles inscribed in a given circle, the equilateral triangles have the greatest perimeter.