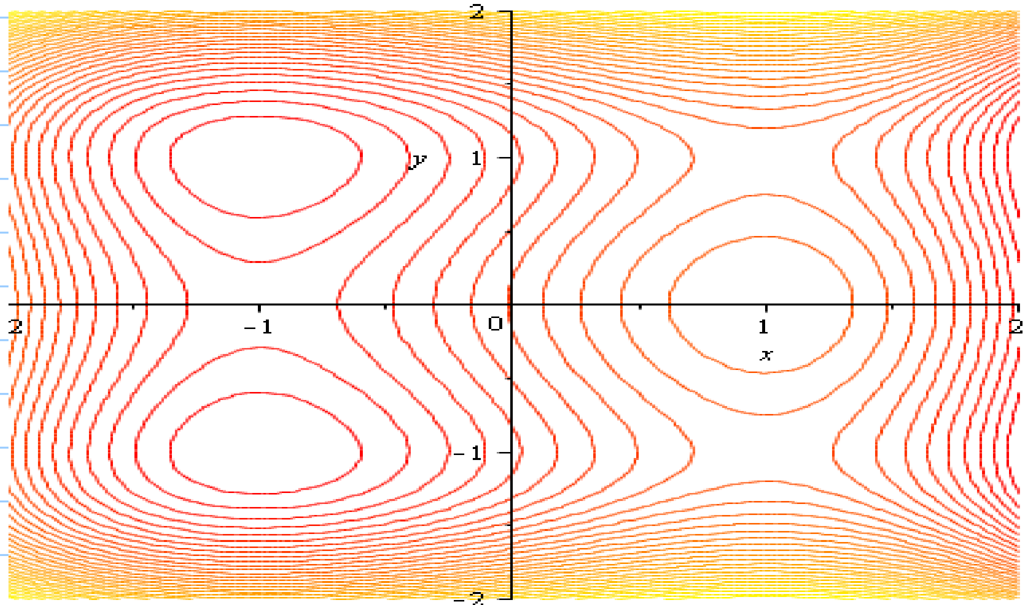
Note Title 10/19/2011

# Calc 3 - Assignment #17

① Use the contour plot of $f(x,y) = 3x - x^3 - 2y^2 + y^4$ to identify local min, max, or saddle points if any.




(Hint: there are six critical points)

② Find all max, min, and saddle points for

a) $f(x,y) = 9 - 2x + 4y - x^2 - 4y^2$

b) $g(x,y) = x^3 y + 12x^2 - 8y$

③ Find the local max., min., and saddle points, if any, for $f(x,y) = x^4 + y^4 - 4xy + 1$.
Visualize your answer by drawing the surface and/or contour plot in Maple.
(Note: there are three critical points)

(4) Use Maple to draw the surfaces / contour plots for the following functions and guess any max, min, and saddle points.

a) $f(x,y) = x^2 + y^2 + x^2 y^2$

b) $g(x,y) = x^4 - 5x^2 + y^2 + 3x + 2$

(5) Continuous functions of one variable can not have two local max without having a local min. For two-variable functions this is different: Show that

$$f(x,y) = -(x^2-1)^2 - (x^2 y - x - 1)^2$$

has only 2 critical points, both of which are max. Use Maple to visualize the function.

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

(7) Find three positive numbers whose sum is 100 and whose product is max.

(8) Find the rectangular box with largest volume and total surface area of $64\,cm^2$.