**Maximum and Minimum Values**

1. Find the critical points of the following functions, and classify each one as a point where $f$ has a local maximum value, a local minimum value, or a saddle point.

   i)$f(x, y) = 3xy - x^3 - y^3$

ii) $f(x, y) = x^2 + 50y^2 + x^2y$

2. Consider the function $f(x, y) = x^2 + y^2(1-x)^3$. Show that $f$ has a unique critical point and that, at that critical point, $f$ attains a local minimum value. Show, however, that $f$ does not attain a global minimum value at the critical point.

Note: Optimization in Sections 14.7 and 14.8 will be covered after the mid-term exam. The homework problems you should be able to do in Section 14.7 before the mid-term exam are 6, 7, 8, 12, 17, 18 and 21.