(c) Determine the types of the critical points. If the critical points are non-degenerate, use the second derivative test to determine the type of the critical point. If the critical points are degenerate, use properties of the function to determine the type of the critical point.

For each critical point, must consider the sign of A and of the Hessian. For (0,0), A = 18 > 0 and $AC - B^2 = 148 > 0$, we conclude that it is a local minimum. For the others, since $AC - B^2 = -24^2 < 0$, they are all saddles. See Figure 1 for a plot of the graph of f. Note that it is not necessary to plot the function in order to draw these conclusions.



Figure 1: Graph of f for problem 2.