Himmelblau's function is a function used to test optimization algorithms. It is defined as:

$$f(x_1, x_2) = (x_1^2 + x_2 - 11)^2 + (x_1 + x_2^2 - 7)^2$$

(a) Take the gradient of Himmelblau's function.

(b) Make a contour plot of Himmelblau's function from $-5 \leq x_i \leq 5$. Overlay a quiver plot which shows the direction and magnitude of the gradient at different points on the surface.

(c) Why is Himmelblau's function used to test optimization algorithms? Hint: think of a ball rolling around on the surface defined by this function. How would its final destination change based off where you start?