Quiz #5 for Calculus 3 (MATH-UA.0123-001)

Problem 1. Let $y = f(\vec{x})$ be a scalar-valued function of a vector $\vec{x}$. If $\vec{x}^*$ is a critical point of f, what condition must f satisfy? [*2 points*]

Problem 2. Let $f(x, y) = \frac{1}{2}Ax^2 + Bxy + \frac{1}{2}Cy^2 + Dx + Ey + F$. Find f's critical points. Write down any assumptions you make on the coefficients of f (that is: A, B, C, D, E, and F). [*4 points*]

Problem 3. For the same f as in Problem 2, check the conditions under which these critical points are local maxima, local minima, or neither. Do you notice anything? [*4 points*]