Worksheet for September 17

Problems marked with an asterisk are to be placed in your math diary.

(1) Find and classify the critical points for:

(i*) $f(x, y) = x^2y + y^2 + xy$.

(ii*) $f(x, y) = -\sqrt{x^2 + y^2} + 2$.

(iii) $f(x, y) = x^3 - 3x - y^2 + 4y$

(2*) Find the absolute maximum and minimum values of $f(x, y) = x^2 - y^2 + 5$ on solid triangle with vertices (0,1), (-1,-2), (2, -10). Hint: The boundary of the triangle consists of three sides, each of which is a line segment. For each side, write an equation of the corresponding line. Then put this equation into $f(x, y)$ to create a function of one variable over a closed interval and use the techniques of Calculus I to find the absolute extreme values of this function on an appropriate closed interval. Now compare all these values with any extreme values found in the interior of the triangle.