Math 203 — Global optimization

Problem 1. Let $f(x, y) = x^2 - 2xy + 4y^2 - 4x + 24$. Find the global extrema of f on the domain whose boundary is given by the triangle with vertices $(0, 0), (4, 0)$, and $(4, 2)$.

Problem 2. The sum of the *length* and *girth* of a rectangular box cannot exceed 130 inches. The *girth* of a box is defined to be twice the sum of its *width* and *height*. Assuming you want to make a box with equal width and height, find the maximum possible volume of such a box under the given constraints.

Problem 3. Find the maximum volume of a cylindrical soda can such that the sum of its height and circumference is 120 centimeters.