13 10-07-2025 - Midterm 2 tomorrow

Use the method of Lagrange Multipliers to find the maximum and minimum values of the function subject to the given constraints.

13.1 Section 4.8, Exercise 369

Minimize $f(x, y) = x^2 + y^2$ on the hyperbola $xy = 1$.

13.2 Section 4.8, Exercise 373

The curve $x^3 - y^3 = 1$ is asymptotic to the line $y = x$. Find the point(s) on the curve $x^3 - y^3 = 1$ farthest from the line $y = x$.

What is the function we seek to minimize?

13.3 Section 4.8, Exercise 374

Maximize $U(x, y) = 8x^{\frac{4}{5}}y^{\frac{1}{5}}$ under constraint $4x + 2y = 12$.

13.4 Section 4.8, Exercise 379

Maximize $f(x, y, z) = x^2 + y^2 + z^2$ under constraints $x + .y + z = 9$ and $x + 2y + 3z = 20$.

13.5 Section 4.8, Exercise 388

A large container in the shape of a rectangular solid must have a volume of $480m^3$. The bottom of the container costs $\$5/m^2$ to construct, whereas the top and sides cost $\$3/m^2$ to construct. Use Lagrange multipliers to find the dimensions of the container of this size that has the minimum cost.