

Lesson 38. Lagrange Multipliers, cont.

Use the Method of Lagrange Multipliers to solve the following problems.

Problem 1. Your firm has been asked to design a storage tank for liquid petroleum gas. The customer's specifications call for a rectangular box tank that is to hold 1000 m^3 of gas. (Assume the tank is closed on all sides.) The customer wants to use the smallest amount of material possible in building the tank. What dimensions do you recommend for the tank?

Problem 2. You are in charge of erecting a radio telescope on a newly discovered planet. To minimize interference, you want to place it where the magnetic field of the planet is weakest.

If we place the planet in a 3D coordinate system whose origin is at the center of the planet, the surface of the planet can be described by the equation $x^2 + y^2 + z^2 = 36$. The strength of the magnetic field is given by $M(x, y, z) = 6x - y^2 + xz + 60$. Where should you locate the radio telescope?