

Optimization Problems

1. What is the maximum volume of beer that can fit into a cylindrical can with surface area 800 centimeters cubed?
2. What is the minimum distance between the parabola $x + y^2 = 0$ and the point $(0,-3)$?
3. Find two numbers whose sum is 66 and whose product is as large as possible.
4. If a farmer has 100 feet of fence and wants to make a rectangular pigpen, one side of which is along an existing straight fence, what dimensions should be used in order to maximize the area of the pen?
5. A box with an open top is to be constructed from a square piece of cardboard, 3 feet wide, by cutting out a square from each of the four corners and bending up the sides. Find the largest volume that such a box can have.