

Optimization Problems

1. A farmer has 2000 ft of fence and wants to fence off a rectangular field by a straight river. The side of the field along the river needs no fence. What dimensions of the field maximize its area?
2. Find the point on the graph of $y = \sqrt{x}$ closest to the point $(4, 0)$.
3. An open-top box is to be made from a rectangular piece of cardboard measuring 8 by 5 inches. Find the dimensions of the box which will maximize its volume.
4. Find the dimensions of the largest rectangle that fits inside a circle of radius 4.
5. A trough is to be made from a piece of sheet metal 90 cm wide by folding up the sides as shown. Find the angle θ that maximizes the volume of the trough. That is, find the angle θ that maximizes the area of the cross section:

