

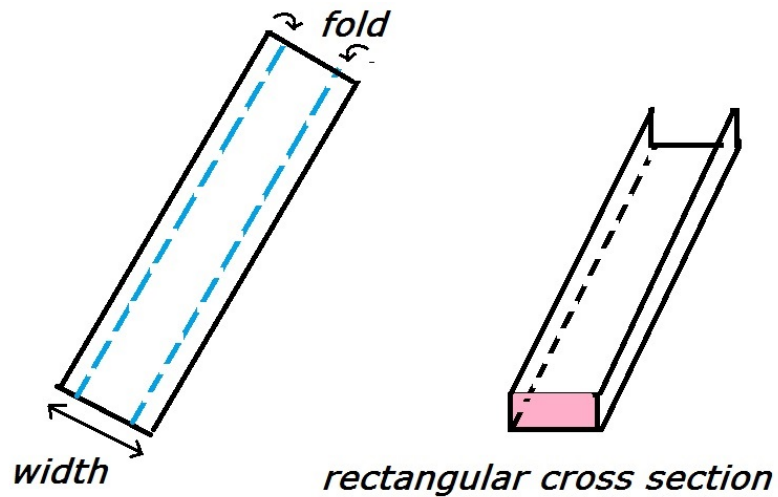
Optimization Lecture Problems

Example 1

A piece of wire 80 centimeters long is cut into two pieces. One is bent into a square, the other into a circle. Where should you cut so that the sum of the areas is minimized?

Example 2

A long rectangular sheet of metal is to be made into a rain gutter by turning up two sides at right angles to the remaining strip. The rectangular cross section is to have an area of 18 squared inches. Find the minimum possible width of the sheet.



Example 3

Find the area of the largest rectangle inscribed in the ellipse

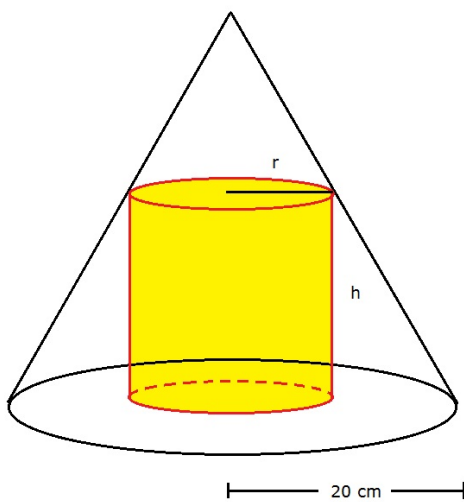
$$\frac{x^2}{4} + \frac{y^2}{9} = 1.$$

Example 4

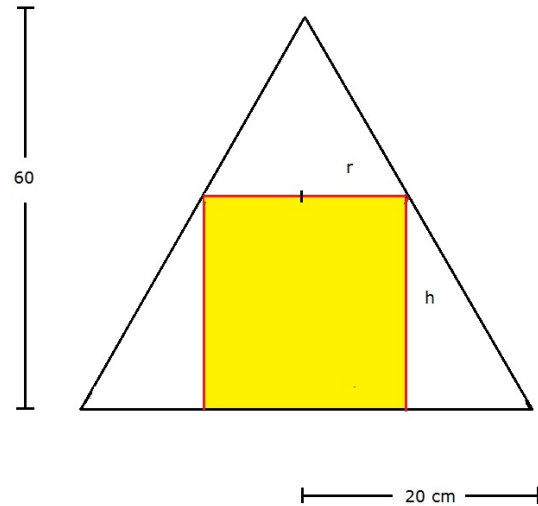
You are making a box with a square open top. The material for the bottom cost 7 cents per squared centimeter. The material for the sides cost 3 cents per squared centimeter. You have \$1. Find the maximum volume you can get spending all your money.

Example 5 - Spring '16 Final Question

Find the height h and radius r of the cylinder of maximum volume that can be inscribed in a cone of radius 20 centimeters and height 60 centimeters. Make sure you justify why the cylinder with the dimensions you give has maximum possible volume.



Cylinder inscribed in a cone



picture of cross-section