1 5.5: Applied Max/Min Problems

Goal: To optimize a practical value subject to certain restrictions (often given geometrically)

Examples:

A closed rectangular storage container with a square base is to have a volume of 2250 cm^3. Material for the top and bottom cost \$0.20 per square centimeter. Material for the sides costs \$0.30 per square centimeter. Find the cost of materials for the cheapest such container.

A poster is to have an area of 150 square inches with 1-inch margins at the sides and bottom and a 2-inch margin at the top. What dimensions will give the largest printed area?

A wire 40cm long is to be cut into at most 2 pieces. The first piece is bent into a square; the second piece is bent into a circle. How should the wire be divided in order to maximize the total area?

Find the shortest distance from the point $(3, 7)$ to the line $y = 2x$.

On Your Own:

Suppose 40π square feet of material are available to make a cylindrical can. Find the radius and height of the cylinder with the largest possible volume. (HINT: The lateral area of a cylinder is $A = 2\pi rh$. Don't forget to include the top and bottom area as well!)

radius $= \sqrt{\frac{20}{3}}$ ft; height $= 2\sqrt{\frac{20}{3}}$ ft.