Sections 4.7: Optimization Problems

Example: Find two numbers whose difference is 65 and whose product is a minimum.

Example: Find the point on the parabola $y = x^2 + 1$ that is closest to the point $(3, 1)$

Example: A circular cylindrical metal container, open at the top, is to have a capacity of 192π in^3. the cost of the material used for the bottom of the container is 15 cents per in^2, and that of the material used for the side is 5 cents per in^2. If there is no waste of material, find the dimensions that will minimize the cost of the material.

Example: Find the area of the largest rectangle that can be inscribed in $\frac{x^2}{4} + \frac{y^2}{16} = 1$

Example: A piece of wire 20 feet long is cut into two pieces. One piece is bent into a square and the other is bent into an equilateral triangle. How should the wire be cut so that the total area enclosed is (a) a maximum? (b) a minimum?

Setup the formula that you would use to solve these problems. Give the domain of the function.

Example: A poster is to have an area of 240 in^2 with a 2-inch margin at the bottom and the sides and a 3-inch margin at the top. What dimensions of the poster will give the largest printed area?

Example: A window has the shape of a rectangle surmounted by an equilateral triangle. If the perimeter of the window is 12ft, find the dimensions of the rectangle that will produce the largest area for the window.