Section 5.5: Applied Maximum and Minimum Problems

EXAMPLE 1: A company wants to manufacture a box with a volume of 36 cubic feet. The box has no top, and the length is twice the width. Find the dimensions of the box that minimizes the amount of material used.

EXAMPLE 2: If 10,800 square centimeters of material is available to make a box with a square base and an open top, find the largest possible volume of the box.

EXAMPLE 3: A poster is to have an area of 180 square inches with 1-inch margins at the bottom and sides and a 2-inch margin at the top. What dimensions will give the largest printed area?

EXAMPLE 4: Find the point on the line $y = 2x - 3$ that is closest to the point $(-1, 3)$.

EXAMPLE 5: Find the dimensions of the rectangle of largest area that has its base on the x axis and its other two vertices above the x axis lying on the parabola $y = 8 - x^2$.

EXAMPLE 6: Find the area of the largest rectangle that can be inscribed in a right triangle with legs of lengths 3 cm and 4 cm if two sides of the rectangle lie along the legs.

EXAMPLE 7: A piece of wire 10 m long is cut into two pieces. One piece is bent into a square and the other is bent into a circle. How should the wire be cut so that the total enclosed area is a maximum? A minimum?