MATH 12002   OPTIMIZATION PROBLEMS   Section 3.5

1. Find two numbers whose difference is 100 and whose product is a minimum.

2. A farmer wants to make two identical rectangular enclosures along a straight river. If he has 600 yards of fence, and if the sides along the river need no fence, what should be the dimensions of each enclosure if the total area is to be maximized?

3. A box with a square base and open top must have a volume of 32,000 cubic centimeters. Find the dimensions of the box that minimize the amount of material used.

4. Find the point on the line $6x + y = 9$ that is closest to the point $(-3, 1)$.

5. 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?

6. Find the area of the largest rectangle that can be inscribed in a semicircle of radius r.

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

8. A Norman window has the shape of a rectangle surmounted by a semicircle. (Thus, the diameter of the semicircle is equal to the width of the rectangle.) If the perimeter of the window is 30 ft, find the dimensions of the window so that the greatest possible amount of light is admitted.