4.7 Optimization Problems

Name: Date: June 10, 2015

P 4. Find two positive numbers such that the product is 185 and the sum is minimized.

P 6. Find two positive numbers such that the second number is the reciprocal of the first number and the sum is minimized.

P 9. Find the length and width of a rectangle that has perimeter 80 meters and maximum area.

P 11. Find the length and width of a rectangle that has area 32 square feet and minimum perimeter.

P 14. Find the point on the graph of $f(x) = (x-1)^2$ that is closest to the point $(-5, 3)$.

P 19. A farmer plans to fence a rectangular pasture adjacent to a river. The pasture must contain 245,000 square meters in order to provide enough grass for the herd. No fencing is needed along the river. What dimensions will require the least amount of fencing?

P 22. A rectangular area is bounded by the x- and y-axes and the graph of $y = (6-x)/2$. What length and width should the rectangle have so that its area is maximum?

P 25. A rectangle is bounded by the x-axis and the semicircle $y = \sqrt{25 - x^2}$.

P 29. A rectangular package to be sent by a postal service can have a maximum combined length and girth (perimeter of a cross section) of 108 inches. Find the dimensions of the package of maximum volumen that can be sent. (Assume the cross section is square).

P 35. The sum of the perimeters of an equilateral triangle and a square is 10. Find the dimensions of the triangle and the square that produce a minimum total area.

P 36. Twenty feet of wire is to be used to form two figures. In each of the following cases, how much wire should be used for each figure so that the total enclosed area is maximum?

(a) Equilateral triangle and square.

(b) Square and regular pentagon.

(c) Regular pentagon and regular hexagon.

(d) Regular hexagon and circle.

What cna you conclude from this pattern? [Hint: The area of a regular polygon with n sides of length x is $A = (\pi/4)[\cot(\pi/n)]^2]$.