

MA 181 SECTION 4.6: OPTIMIZATION PROBLEMS

Note:

1. Steps for solving problems pages 299-300
2. First Derivative Test for Extreme Values page 302

EXAMPLES:

1. A 400 meter track is to be constructed with two parallel straight-aways of equal length and two equal semi-circular curves. If s is the length of the straight-away and r is the radius of the semi-circular curve, what dimensions for r and s will enclose the largest infield area?

Step 1: What do we know, what do we need to find?

Step 2: Draw and label a diagram.

Step 3: Introduce Notation

Step 4: Express quantity to be optimized in terms of the other variables.

Step 5: Express quantity in only one variable

Step 6: Find the optimum value for the quantity

2. A rectangular container with an open top is to hold 20ft^3 . The length of the base of the container is twice the width. Material for the base cost \$10 per square foot and materials for the sides cost \$6 per square foot. Find the dimensions of the container that will minimize the cost.
3. A rectangular region with area 3200ft^2 is to be enclosed within a fence. The two sides which run north and south will use material that costs \$1 per foot, while the other two sides require material that costs \$2 per foot. Find the dimensions of the rectangular region that will give the smallest cost.