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Math 31A Lecture Notes: Optimization

Example 1: A piece of wire of length L is bent into the shape of a rectangle. How do we bend such that the enclosed area in maximal?

Formula: (area for a rectangle)

Constraint: (perimeter of a rectangle)

Solution:

Step 1: Manipulate the constraint

Step 2: Substitute in the isolated variable from the constraint

Step 3: Differentiate the formula

Step 4: Apply the 1st derivative test to Apply the second derivative test to test for

get one of the critical points maximum or minimum.

negative maximum

Step 5: Substitute the variable from the test into the formula

Alternative solution:

Since and and are positive on , maximize on the interval .

|  |  |
| --- | --- |
| Critical Points |  |
| 0 | 0 |
|  | max of on |
|  | 0 |