## Maximum and Minimum Number Problems

Objectives: Solve maximum and minimum problems using derivatives
Warm Up: How do we find the maximum and/or minimum values of any curve.

Investigate: Different pairs of numbers may have the same sum but they will have different products. Among these products it is possible to find a maximum value. Trial and error could be used to identify these values, but that procedure would become timeconsuming as the given sum increases. The following examples shows a way that calculus solves this and similar problems.

1. Find two positive numbers whose sum is 15 and whose product is a maximum.
2. Find two numbers whose difference is 100 and whose product is a minimum.
3. Find two positive numbers whose product is 108 and the sum of the first number plus three times the second number is a minimum.
4. Find to positive numbers whose sum is 30 and the square of one number plus twice the square of the other is
a) a minimum
b) a maximum

## Homework:

1. The sum of two natural numbers is 28 . Find these two numbers if their product is a maximum.
2. Find two consecutive natural numbers if the sum of the larger number and four times the reciprocal of the smaller number is a minimum.
3. The sum of two positive numbers is 4 . If the sum of their cubes is a minimum, what are these numbers?
4. Find two numbers that satisfy the conditions that the sum of the first number and twice the second number is 100 , and the product is a maximum.

## Solutions:

1. The two natural numbers are 14 and 14 .
2. The two numbers are 2 and $2+1=3$.
3. The two numbers are 2 and 2 .
4. The two numbers are 50 and 25 .
