

MA 16010 Lesson 24: Optimization I

Goal: Apply calculus in real(-ish)-life problems to optimize outcome: maximize something (profit, area, volume, ...) or minimize something (cost, ...)

Example: A small rectangular garden should be enclosed by a wall on one side and a fence on the other sides. We have 20 m of fencing materials at our disposal. What are the dimensions of the garden so that its area is the biggest possible?

Optimization problems in steps:

- 1.
- 2.
- 3.
- 4.
- 5.
- 6.

Example: Find the pair of non-negative numbers such that their product is 25 and their sum is minimal possible.

Example: A piece of cardboard has dimensions 6 in \times 12 in. A square is to be cut from each corner and the sides folded up to make an open-top box. What is the maximum possible volume of the box? Round your answer to three decimal places.

Example: A carpenter is building a rectangular room with a fixed perimeter of N feet (where N is a fixed positive number). What are the dimensions of the largest room that can be built, and what is the room's area?