

# Applied Optimization

## Reading

- Section 4.6

## Practice problems

- Section 4.6: 9, 11, 13, 35, 61
- In class: 4.6 3, 10, 25, 14, 51, 59
- To turn in: 4.6 2, 4, 8, 20, 52
- Challenge: 4.6 44

## Notes

### Applied Optimization

Applied optimization problems are word problems that involve a physical design with some variable quantities and a target quantity that we want to minimize or maximize. We then turn this into a mathematical problem of finding the minimum or maximum of some function  $f(x)$  over some interval.

The main steps would be the following:

- Read the problem carefully, at least twice.
- Identify a proper sketch of the problem description.
- Identify known quantities in the sketch.
- Identify which quantity (or quantities) varies, assign a variable(s) to it.
- Identify what constraints your variables have, given the physical restrictions of the problem (for example lengths cannot be negative).
- Identify what quantity we want to maximize or minimize, and which of those two directions is our goal.
- Describe that quantity as a function of the variables in question.
- Apply the methods we have for finding the maximum or minimum of a function over an interval (or occasionally over an open range like  $(0, \infty)$ ), to find the value of the variable that achieves the desired objective.
- Make sure that value makes physical sense.