

Principles of Optimization – Rethinking Chapter 1

1. Consider the *College Town* round trip problem. Using the model elements from the text, write out the linear program. Does this model work if there are four towns to visit besides Portland? Five? Always?
2. Consider the *Iron Works* steel manufacturing problem. Using the model elements from the text, write out the optimization model. Examine each constraint carefully and report your findings.
3. Consider the *Art Musuem* renovation problem. Using the model elements from the text, write out the optimization model (writing only as many constraints as you need to make it clear). Modify the model to ensure that each task is scheduled at its earliest possible time (see Section 1.4.4).
4. Consider the *Airline Hub* problem. Write out the optimization model using summation notation. Devise a “greedy” algorithm (or two or three) and show that the number of passengers which stay on their plane is not greater than the optimal (98 passengers). A greedy algorithm tries to select the largest possible numbers from a table without a global understanding of the values in the table.
5. Consider the *Gerrymandering* problem. Write out the optimization model using the model elements from the text and using summation notation. What can we say about any optimal solution returned by this model? Change the model to determine the districting that most evenly divides the population while still satisfying the gerrymandering condition. (Challenging!)
6. Consider the farmer’s problem which we solved graphically in class (also posted on the class website). Now consider the additional condition that *if* the farmer plants more than one type of crop, it will require 40 hours of the labor budget just to deal with changes in equipment during the season. Discuss how you might formulate such a condition.