MATH3202/7232 Operations Research & Mathematical Planning 2020

Week 6 – Modelling Examples

Minimax

Suppose we want to find the solution that minimises

$$\max_i \sum_j c_{ij} x_j$$

How can we do this using linear programming?

Minimising Absolute Error

In regular least squares fitting for data we choose a line to minimise the sum of the squared vertical distances of points from the line. This has a nice solution but can be badly affected by large deviations.

A more robust approach is to minimise the absolute error between points and the line. How can we do this using linear/integer programming?

Sudoku

Consider the following puzzle (the 'Tough Sudoku' for March 28th from sudoku.com.au):

			1					
	2	4		5				
				8		3	7	5
9						4		
	7						3	
		2						8
1	5	8		9				
				6		9	1	
					3			

Sudoku provided by Sudoku.com.au

Formulate an integer programming problem that will solve this Sudoku puzzle.

English-14

Suppose you want to write in English but have to restrict yourself to just 14 letters. You can choose any 14 but then you can only use words made up of those letters. Which 14 letters would you choose?

Tables and Chairs

A food court would like to place tables and chairs so that they can maximise the number of chairs in the area below, while ensuring that

- there is at most one chair or table per square, but nothing on the rubbish;
- no tables touch (even diagonally); and
- a chair must have a table beside it.