MATH3202/7232 Operations Research & Mathematical Planning 2019

Week 5 – More IP Models

Concrete

A ready mix concrete company has 50 large batching plants and 50 large jobs. It knows how far away each job is from each plant. How should it assign each job to a plant so as to minimise the total distance between jobs and plants?

Linear Assignment Problem

As a smaller example, consider the following matrix of assignment costs:

	1	**2**	**3**	**4**	**5**
1	48	56	31	59	34
2	47	54	94	74	36
3	67	12	67	31	43
4	74	31	37	23	55
5	60	41	27	39	44

How should the rows be assigned to the columns?

Noughts and Crosses

How can you fill in a noughts and crosses grid with a specified number of X's (and the balance O's) so that the number of lines completely formed of X's or O's is minimized?

Piecewise Functions

Euing Petroleum produces two types of petrol (blend 1 and blend 2) from two types of oil (oil 1 and oil 2). Each litre of blend 1 must contain at least 50% oil 1 and each litre of blend 2 must contain at least 60% of oil 1. Each litre of blend 1 is sold for $1.20 and each litre of blend 2 is sold for $1.40. Currently 500 litres of oil 1 and 1,000 litres of oil 2 are available. As many as 1,500 litres more of oil 1 can be purchased, at the following prices:

- First 500 litres - $2.50 per litre
- Next 500 litres - $2.00 per litre
- Next 500 litres - $1.50 per litre.

Formulate an IP that will maximise Euing's profit.