

CS635 – Problem Set #6

Due Date: March 6, 2009

Instructions for Handing In Homework

Formulate the following problems in GAMS and solve them. Submit this assignment electronically using the instructions on the course web page. You should hand in exactly 3 files with the following names: `hw6-1.gms`, `hw6-2.gms`, `hw6-3.gms`.

Ensure you use self-explanatory variable names, and that you comment any assumptions made to clarify your model formulation. Also, ensure that answers required for the question are displayed as the last line of the listing file produced.

1 Facility location problem

A large company wishes to open new depots to deliver to its sales centers. Every new setup of a depot has a fixed cost. Goods are delivered from a depot to the sales centers close to the site. Every delivery has a cost that depends on the distance covered.

The list of depots and sales centers and their related costs are provided in the file "facility.dat". Furthermore, the capacity of each depot and the demand at each sales center is provided in that file.

1.1 Problem

Which depots should be opened to minimize the total cost of construction and of delivery, whilst satisfying all demands?

1.2 Problem

What if Depot 1 has to be open?

1.3 Problem

What if Depot 2 has to be open?

1.4 Problem

What if both Depots 1 & 2 have to be open?

Note that at the end of the GAMS file, you should arrange to display for each of the questions the total cost, and the list of depots that are open.

2 Maximum set problem

The data for this problem is given in the include file "maxmatrix.dat" on the course webpage.

2.1 Problem

Given a symmetric matrix D , the problem is to choose the largest index set I so that $D(i, j) \geq \text{threshold}$ for all i, j in I .

Just display the set I that you determine at the end of your file.

3 Who owns the Fish?

In a street there are five houses, painted five different colours. In each house lives a person of different nationality. These five homeowners each drink a different kind of beverage, smoke different brand of cigar and keep a different pet.

3.1 Problem

Who owns the fish?

Hints:

1. The Brit lives in a red house.
2. The Swede keeps dogs as pets.
3. The Dane drinks tea.
4. The Green house is on the left of the White house. (i.e. the number of the white house is one less than the green house)
5. The owner of the Green house drinks coffee.
6. The person who smokes Pall Mall rears birds.
7. The owner of the Yellow house smokes Dunhill.
8. The man living in the centre house drinks milk.
9. The Norwegian lives in the first house.
10. The man who smokes Blends lives next to the one who keeps cats.
11. The man who keeps horses lives next to the man who smokes Dunhill.
12. The man who smokes Blue Master drinks beer.
13. The German smokes Prince.
14. The Norwegian lives next to the blue house.
15. The man who smokes Blends has a neighbour who drinks water.