Yuke Luo

Question 1:

The maximum flow is 28 slows that can be sent from tank 1 to tank 8 per hour. The maximum outflow from tank 1 is 35, and every node must have the same outflow as its inflow; therefore, the net flow from tank 2 to tank 7 must be 0. The maximum flow is then, the absolute value of the net flow of tank 1 or node 8.

Question 2:

I use 'optrees' and 'igraph' packages to do this problem. The final value will get over the double of the original one, which is 62 from k=3, but it will not allow it to get to exactly and precisely double the maximum flow per hour from tank 1 to tank 8. When k= 1, max flow equals to 28. When k = 2, max flow = 55. When k = 3 and larger, the max flows constantly equal to 62.

Question 3:

This is the extra credit and is too hard for me to do, so I didn't do it.

Question 4:

I request the data of dcs and stores from mysql separately and use cbind to combine them together. Then I built a new matrix to record the mileages between dcs and stores and then send it back to mysql. The function haversine() helps a lot.

Question 5:

The minimum total cost is 190282.7778 after calculating. The fixed cost is 122000 and variable cost is 68282.77777. There are two decision variables in my model, one is demand of trailers and the other is a binary matrix telling whether there is relationship between a dc and a store. I built a third matrix to find in the condition of having relationship between a dc and a store, how many trailers are needed.

Question 6:

The best objective value is 1.902827777720e+05 , which is the same as I did in the excel, which is what we expected.

Question 7:

The best objective 3.004475777521e+07. I used a function called 're.findall' from google to find the id of dcs and stores when sending the data to mysql.


Question 9:

There are about $80,000 more cost after adding the condition that there is an additional expense of $250 is incurred. A new matrix is built to check which one  trip need to add the additional $250. Sumproduct of the additional fee matrix with binary matrix and requirements matrix is the final additional cost. The results of decision variables did not change.