Module 11 – lecture 2

1. What is the difference between regression analysis and data envelopment analysis?
2. What do you mean by efficient frontier?
3. An ITES company plans to evaluate suppliers for BPO project. The company collects data for BPO's for the input variables; Number of hours per day, Average number of years of years of experience of employees, Number of employees. The output variables considered for evaluation are number of projects handled successfully so far and service level achieved in percentage. Find the most efficient BPO, which may get contract from ITEs Company. The input and output data is given below.

Inputs				**Outputs**	
BPO	**Number of working hours per day**	**Experience (years)**	**Number of employees**	**Number of projects**	**Service level**
1	8	2	50	110	95
2	10	2.5	45	100	98
3	9	1.5	55	120	99
4	8	3	47	105	96

4. Evaluate the relative efficiency of 5 banks using DEA for the input and output variables and data as given below in table.

Inputs			Outputs	
Bank	**Number of tellers**	**Teller hours**	**Saving accounts**	**Loan applications**
1	20	20	10,000	200
2	18	30	10,000	180
3	22	40	12,000	195
4	19	20	11,000	205
5	21	10	10,000	190

Module 11 – lecture 3

1. Consider the following continuously operating maintenance job shop. Inter arrival times of jobs are distributed as follows:

Time between arrivals (Hours)	Probability
0	0.23
1	0.37
2	0.28
3	0.12

Processing times for jobs are normally distributed with mean 50 minutes and standard deviation 8 minutes. Construct a simulation table and perform a simulation for 10 new jobs. Assume that, when simulation begins, there is one job being processed (scheduled to be completed in 25 minutes) and there is one job with a 50 minutes processing time in the queue.

(i) What was the average time in the queue for the 10 new jobs?

(ii) What was the average processing time of the 10 new jobs?

(iii) What was the maximum time in the system for the 10 new jobs?

2. Small town taxi operates one vehicle during the 9.AM to 5 PM period. Currently, consideration is being given to the addition of a second vehicle to the fleet. The demand for the taxis follows the distribution shown:

Time between calls (minutes)	15	20	25	30	35
Probability	0.14	0.22	0.43	0.17	0.04

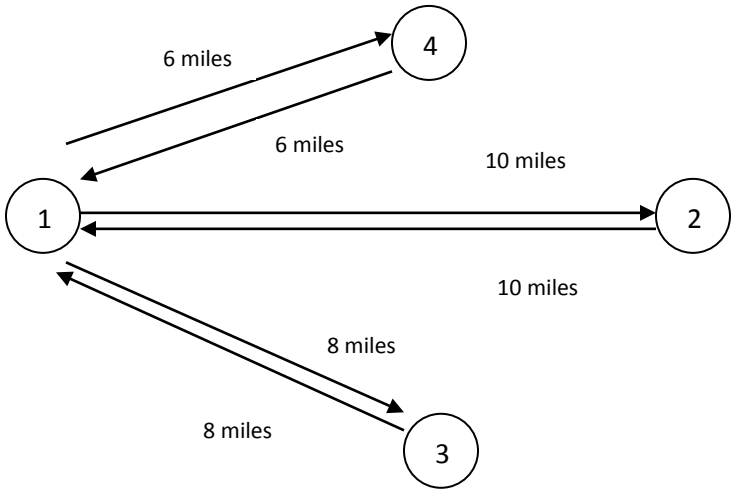
The distribution of time to complete a service as follows:

Service time (Minutes)	5	15	25	35	45
Probability	0.12	0.35	0.43	0.06	0.04

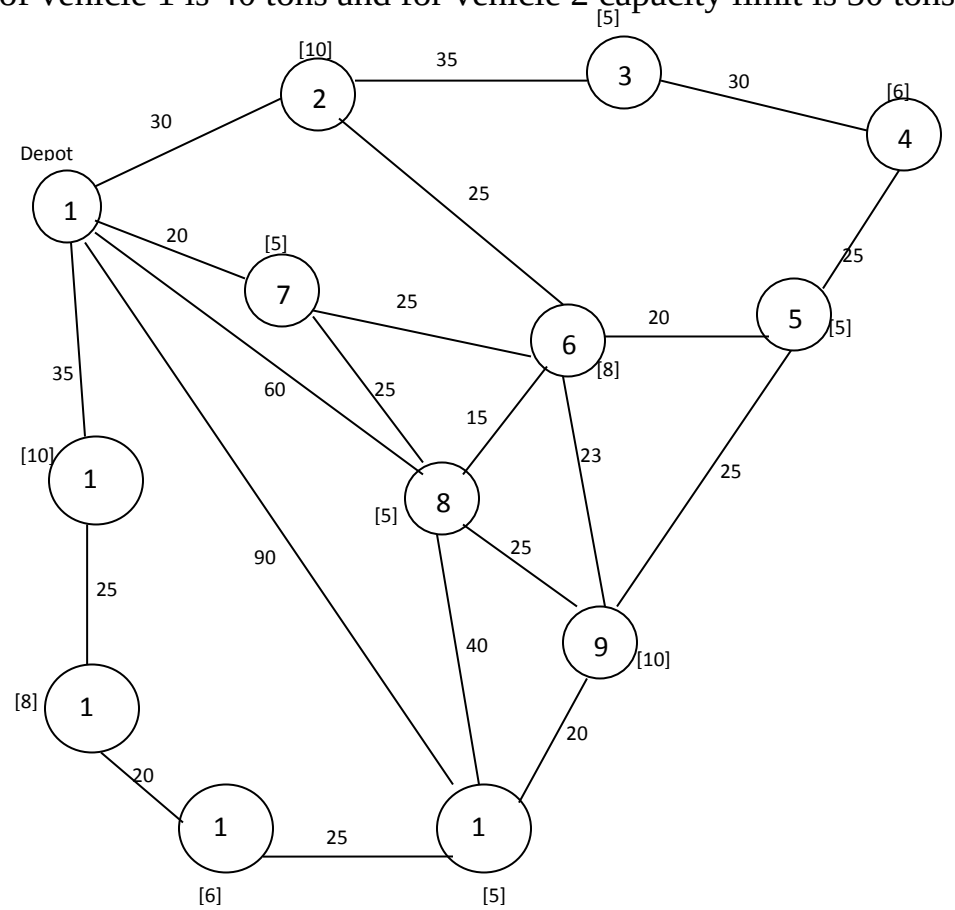
Simulate 5 individual days of operation of the current system and of the system with additional taxi cab. Compare the two systems with respect to the waiting times of the customers and any other measures that might shed light on the situation.

Module 11 – lecture 4

1. Apply C & W savings heuristic to the network given below. The distance between nodes 4 and 2 is 4 miles; nodes 2 and 3 is 5 miles; nodes 4 and 3 is 7 miles.



2. For the network given below find tours that will minimize the total distance traveled by the two vehicles starting and ending at the depot (node 1). The demand at each node is given in parentheses and arcs represent the distance (kms) between nodes. Capacity of vehicle 1 is 40 tons and for vehicle 2 capacity limit is 50 tons.



3. Solve the problem given below using concurrent scheduler approach. Deadhead time is 20 minutes. Find the minimum number of vehicles required to meet the service requirement.

Task	Start	End
1	9:00 AM	9:45 AM
2	9:15 AM	10:00 AM
3	10:10AM	11:15 AM
4	10:20AM	11:45 AM
5	10:45 AM	12:00 NOON
6	1:00 PM	1:45 PM
7	1:20 PM	2:30 PM
8	1:45 PM	2:45 PM
9	2:15 PM	3:00 PM
10	3:30 PM	4:15 PM