NORTHEASTERN UNIVERSITY

Department of Mechanical and Industrial Engineering

Supply Chain Engineering **Prof. Gupta**

IE 7200 **Spring 2014 (Mondays)**

Homework No. 4

(Due: Tuesday, February 18, 2014 by Noon in my office)

Problem 1. Find the most economical aggregate plan amongst the following three:

1. Lay off people in January and reduce capacity to 4 units/day. Then in August, rehire people and increase capacity to 5 units/day. There is regular production for the first 7 months and regular plus overtime for the final 5 months.
2. Reduce capacity to 4 units/day for the first 3 months and bring it back to 5 units/day thereafter. Allow regular time production only, for the entire year.
3. Reduce capacity to 3 units/day for the first 7 months and 5 units/day for the last 5 months. Regular time only is allowed for the first 7 months and regular plus overtime for the last 5 months. Stockout at the end of the year is acceptable.

The following data is given:

Cost of stock-out	$ 50/unit/month
Cost to carry inventory	$ 25/unit/month
Cost to decrease capacity	$ 400/unit
Cost to increase capacity	$ 500/unit
Cost to manufacture (overtime)	$ 400/unit
Cost to manufacture (regular time)	$ 300/unit
Initial inventory	50 units
Present capacity	5 units/day

Month	**J**	**F**	**M**	**A**	**M**	**J**	**J**	**A**	**S**	**O**	**N**	**D**
Forecast	50	60	70	65	55	80	250	250	110	100	80	60
Regular production days	22	18	23	21	22	21	20	20	22	22	21	20
Overtime production days	3	3	3	3	4	3	3	3	4	4	3	2

Problem 2. A producer is considering either producing and/or procuring certain part. The relevant data is as follows:

	Period			
	1	2	3	4
Production Capacity				
In-house	30	40	60	60
Outside Vendor	60	60	60	60
Unit Cost				
In-house	20	20	21	22
Outside Vendor	26	26	26	26
Demand	60	80	100	120

The initial inventory is 20 units and the holding cost is $5 per unit per period. Twenty units must be made available in inventory at the beginning of period 5. Use transportation algorithm to find the optimal aggregate plan.