

ISyE 3104 - Homework #3 BONUS Question
Due: September 15, 2005
(15 points)

Remember the SCL Manufacturing question from homework #2. Instead of using either one of the policies, namely zero inventory and constant-workforce policy, SCL wants to find the optimum policy for its production planning problem. In order to find this, SCL calculated its unit production cost and found it to be \$40 per unit in regular work time, but an additional \$20 per unit is required while producing in overtime. Due to its labor availability and the contract with the supplier of machines the overtime has an upper limit of 500 hours per month regardless of number of machines on hand. However, there is an option to outsource the tables from a third party manufacturer at a cost of \$80 as much as needed.

Using the new information provided together with the already available homework question and considering all the costs presented, model this problem as a linear program in an LP solver (i.e. Xpress, Lindo, Excel Solver...etc) and solve to optimality.

- a)** (10 points) Provide the definitions of the variables in your model on a separate sheet. Return the printouts of your model and output file (optimal solution) with your homework (You may have fractional values for some variables in the optimal solution, but it is OK!) Make sure that in your output you have values for “# of machines on hand”, “inventory level”, “total production level (including overtime)”, “overtime production level” and “# of tables outsourced” for each month.
- b)** (1 point) What is the total cost of the optimal production plan? What is the average inventory level over the 5 month period?
- c)** (3 points) Now round “up” the values of number of machines on-hand and put these values to your model as additional constraints. (Force the “# of machine” variables to be equal to these rounded-up values.) Re-solve your model with these extra constraints and include your output printouts as in part (a). Now, what is the new total cost? Is it increased? Decreased? Why?
- d)** (1 point) In the second solution what is the average on-hand inventory?