Homework #2

Due: Thursday, Feb. 1

1. Lamp problem

Company A has agreed to the supply the following quantities of special lamps to
cOMPANY B during the first four months of next year:

<table>
<thead>
<tr>
<th>Month</th>
<th>Jan</th>
<th>Feb</th>
<th>Mar</th>
<th>April</th>
</tr>
</thead>
<tbody>
<tr>
<td>Units</td>
<td>150</td>
<td>160</td>
<td>225</td>
<td>180</td>
</tr>
</tbody>
</table>

Company A can produce a maximum of 160 lamps per month at a cost of $35 per
unit. Additional lamps can be purchased from Company C at a cost of $50 per lamp.
Company A incurs an inventory holding cost of $5 per month per unit held in storage.

(a) Formulate the problem that Company A is facing as a linear program. Clearly
state any assumptions that you make.

(b) Write an OPL Studio code to solve this problem.

(c) Answer the following questions.

(i) Company A is considering some preventive maintenance during one of the
first three months. If the maintenance is scheduled for January, the company
can manufacture only 151 units (instead of 160); the maximum production
is maintenance is scheduled in February or March is 153 and 155 units re-
spectively. When would you recommend doing the maintenance and why?

(ii) Company D has offered to supply up to 50 lamps (total) to Company A
during either January, February or March. Company D charges $48 per
lamp. Should Company A buy lamps from Company D? If yes, when?

(iii) Company C has offered to lower the price of units supplied to Company
A in February. What is the minimum decrease that would make this offer
attractive to Company A?

2. Coin changing problem

Consider a country where the coin denominations are 5, 10, 20, 25, and 50 cents.
You work at the Beep ’n Buy convenience store and must give a customer 90 cents in
change.

Formulate and solve the integer program that can be used to minimize the number of
coins needed to give the correct change. Use OPL to solve the problem.
3. *Clothing Problem*

Consider the clothing buying problem considered in class and on the website in the IP formulations document.

- Write OPL code to solve this problem in the spirit of gasmodelA, i.e. do not use variables other than decision variables. Hand in your input and output.
- Write OPL code to solve this problem in the spirit of gasmodelD, in which you have defined variables, have an auxiliary data file and labelled constraints. Hand in your input and output.