Métodos de Apoio à Decisão – Assignment 2

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With the recent setting up of human communities outside the Earth, exporting marmalade to other planets became a flourishing activity in the year of 2056. Your company has specialized in the production of this delicacy, exporting to Venus, Mars and Mercury. These markets consume currently three types of marmalade: regular (R), classical (C) and intense (I); assume there is no limit on demand. The current forecast for unit prices (in solarcoins) for 2057 are the following:

Month	Venus R C I	Mars R C I	Mercury R C I
1	12 13 10	10 23 20	8 8 10
2	10 25 10	10 35 20	7 5 11
3	10 28 10	10 38 20	7 8 10
4	10 32 10	10 42 20	9 12 12
5	22 32 10	10 42 20	12 12 13
6	32 40 25	10 50 35	22 20 15
7	13 45 52	10 55 62	18 35 22
8	11 40 75	10 50 65	19 30 35
9	10 35 20	10 45 30	15 25 30
10	10 33 20	10 43 30	9 23 20
11	10 20 15	10 30 25	7 20 15
12	10 10 12	10 20 22	6 10 12

Production consists of three operations: cleaning, cooking and packing. Your company's production lines allow the manufacture of any of the marmalade types, with the capacity for each of them (in units/month) as follows.

	R	C	I
Cleaning	1000	1535	1750
Cooking	1850	850	1200
Packing	750	1500	2000

There are no limitations on obtaining the required raw materials, at an insignificant price.

Assume that there is unlimited inventory capacity on Earth, with a unit holding cost of 1 solarcoin per month (i.e., the company must pay that amount for each unit of any of the marmalades left in stock at the end of each month).

Your company may decide to charter one shuttle each month for any of the planets, each with a capacity of 1000 units. **Each of these trips, if ordered, will have a cost of 10000 solarcoins.**

1. Formulate the problem. Determine the optimal revenue and the corresponding production plan. (You will be graded on the complete description of a correct model.) (50%)

2. Formulate the problem. Resolve the problem considering that there may be also inventory on each of the planets (for local delivery), at the cost of 2 solarcoins per month and per unit kept in stock at the end of a period. Compare the solution to the previous. (50%)

Note: the deadline for handing the report is 14/MAY. Your report should ideally have 4 pages. Each working group should ideally have two students (three are also permitted), and should submit a report and the programs used as tar/zip archive in the course's Moodle page. Please use students code in the name (e.g., up201900001up201900002.tgz). **Each pair of students cannot do more than one assignment together.**