OR LAB# 2

Cojocaru Andreea - Cristina

May 2, 2017

1 Finding the function to be minimized

In order to find the function to be minimized we need to analyze the data of the problem, let's denote the area that will be forest as x0, the are where we will cultivate potatoes as x1 and the area where will be cultivated grapes as x2.

1.1 Care

For the forest area we will spend 100 lei/month, therefore 1200 lei/year. For the cultivation area we will spend 200 lei/month, therefore 2400 lei/year.

1.2 Profit

For the forest area we will have 20000 lei/sq. km/year.

For the area with potatoes, if we use all 0.7 sq. km, we will harvest 7 tones of potatoes twice a year, so 14 tones of potatoes a year. We will have 2000 lei/tone so we will have a profit of 28000 lei/year from this area.

For the area with grapes, if we use all 0.7 sq. km, we will harvest 14 tones of grapes per year, from it we will make 2800 liters of wine, and the profit from sales will be 16800 lei/year.

1.3 Expenses

For the area with forest we will have 0 lei/year additional expenses.

For the area with potatoes we will have 70 lei for seeds twice a year, that makes 140 lei/year for seeds, 350 lei for the tractor also twice a year, that makes 700 lei/year for the tractor. Total: 840 lei/year.

For the area with grapes we will have 560 lei/year for seeds, **let's assume that they are magical and will grow grapes from the first year,** we will also spend 3500 lei/year for the workers who will collect the grapes. Total: 4060 lei/year.

So to find the function we will subtract from the profit of each section the amount of leis spent for care and other expanses. We should obtain something similar to this: 18800*x0 + 24760*x1 + 10340*x2. This function we will subject to:

1. $x0 \geq 0.5$
2. $x1 \geq 0$

3. x2 $\geq$ 0
4. -3240 * x1 -1660 * x2 $\geq$ -1500 (the sum of the expenses should not be more than 3 scholarships)
5. x0 + x1 + x2 = 1.2 (in total we should have 1.2 sq. km. of land)

2 Result

I used the function `linprog` from the `scipy.optimize` library in python and my result was that we should use 0.5 sq km for forest, 0.7 sq km for potatoes and 0 sq km for grapes.