JBALIABA

UNIVERSITY OF YAOUNDE II
2022/2023

FACULTY OF ECONOMICS AND MANAGMENT

Tutorial problem set 2
Operational Research, Third year
(Pr. Baye/Pr. Epo/Dr. Mark)

Exercise 1

A music band is ready to hit the road and go on tour. He has a group consisting of 150 dancers, 90 back-up singers, and 150 different musicians and due to union regulations, each performer can only appear once during the tour. A small club tour requires 1 dancer, 1 back-up singer and 2 musicians for each show while a larger arena tour requires 5 dancers, 2 back-up singer and 1 musician each night. If a club concert request to pay the Band 175Mu a night while an arena show pays 400Mu a night. Using the graphical method, identify the BFR, BFS and determine how many of each show should he schedule so that his income is a maximum and what is that maximum income?

Exercise 2

The Cut-Right Knife Company sells three sets of kitchen knives: the Basic set, the Regular set and the Deluxe set. The Basic Set consists of 2 utility knives and 1 chef's knife. The Regular Set consists of 2 utility knives and 1 chef's knife and 1 bread knife. The Deluxe Set consists of 3 utility knives, 1 chef's knife, and 1 bread knife. Their profit is 30 MU on a Basic Set, 40MU on a Regular Set, and 60MU on a Deluxe Set. The factory has on hand 800 utility knives, 400 chef's knives, and 200 bread knives. Assuming all sets are sold, how many set should be sold to maximize the profit. What is the maximum profit?

Exercise 3

A Cameroonian based company producing chocolates requires two raw materials A and B of 100 tons and 80 tons each week. The director of the company wishes to satisfy the increasing demand of white, black and blue chocolates. The raw materials can be blended in different ways to produce these three different chocolates brands. To produce 1 ton of white chocolates, it requires 5 tons of raw material A and 3 tons of raw material B. The black chocolates require 3 tons of raw material A and 5 tons of raw material B, while the blue chocolates require 5 tons of raw material A and 5 tons of raw material B. The profit per ton from selling the chocolates (after allowing for production but not the costs of raw material, which are regarded as fixed) are 250MU, 300 MU and 400 MU for white, black and blue chocolate respectively.

Formulate the LP problem which could permit the director decide what quantity of each chocolates brand to produce each week to maximize profits. Determine the optimal profit

Exercise 4

A local brewer firm wishes to produce two types of beer and has the following ingredients in stock malt 140kg, Hops 160kg and Yeast 150kg. The mixture for beer is given in the matrix below

	Malt	Hops	Yeast
Light Beer	6	8	6
Dark Beer	8	4	4

The profits made on the light beer is 4000mu and on dark beer 3000mu. Let's assume that the market is willing to buy whatever is made,

1. Formulate the LP problem that maximizes profit.
2. Determine the maximum profit using the simplex method. What quantity of yeast was used to maximize this profit? Give an interpretation to the quantity of yeast used.
3. What capacity of each ingredient is used by the local brewer firm?
4. Formulate the dual.
5. From (2) above deduce the optimal solution in the dual