

**UNIVERSITY OF YAOUNDE II**  
**FACULTY OF ECONOMICS AND MANAGEMENT**

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**GEST 3 & SECO 3**

**Problem sets for Official TD-Operational Research (By Baye Menjo)**

**Problem Set 1**

**Exercise 1:**

A coffee blending company mixes three different ingredients (A, B, C) in order to manufacture two types of products. The following nutritional restrictions must be respected.

Product I:

- Not more than 30% of A
- Not more than 50% or less than 20% of B
- Not less of B than there is of A

Product II:

- Not less than 50% of A
- Not more than 30% of B
- Amount of B must be less than or equal to A

The cost of A, B, and C is 30 MU, 40 MU, and 35 MU per kg, respectively, and the supply available for these ingredients is 2000, 1000, and 3000 kgs, respectively. Carefully define the decision variables in a table and formulate the relevant LP problem to minimize costs.

**Exercise 2**

A coffee manufacturer blends four components of coffee beans into three final blends of coffee. The four components beans cost the manufacturer 55, 70, 60 and 80 MU per Kg respectively. The weekly availabilities of the components are 300000 400000 250000 and 200000 Kgs, respectively. The manufacturer sells the blends at wholesale prices of 125, 140 and 180 per Kg, respectively. Weekly output should include at least 400000Kgs of final blend 1.

The following are blending restrictions which must be followed by the production master. Component 2 should constitute at least 30 percent of final blend 1 and no more than 20% of final blend 3.

Component 3 should constitute exactly 20 percent of final blend 3.

Component 4 should constitute at least 40% of final blend 3 and no more than 10% of final blend 1.

The objective is to determine the number of Kgs of each component which should be used in each final blend so as to maximize weekly profit. Formulate this as a Linear Programming model, carefully defining your decision variables.