SERIES NO. 2

(OCTOBER 2026)

Exercise 2.1

Foods / nutritional component	F1	F2	F3	Units Required by day
G	9	2	4	20
P	3	8	6	18
V	1	2	6	15
Cost	7	6	5	

In sheep farming, we want to determine the quantities of different types of feed that should be given to each sheep in order to meet nutritional component needs at an optimal cost.
The units of each of the basic nutritional ingredients contained in one kilogram of each type of food are shown in the table above, which also shows the daily nutritional requirements and the cost of the food types per kilogram.

To construct the linear programming model for this problem:

1) What are the unknowns of the problem and how many decision variables do you need to define?
2) What are the restrictions associated with this sheep farming?
3) Are there any other restrictions on the decision variables?
4) What type of optimization should be considered?
5) How many economic coefficients are there in the objective function?
6) Construct the linear program for this problem?

Exercise 2.2

We propose to create an economical feed for animals, which necessarily contains four types of nutrients: A, B, C, and D. The food industry produces two feeds, M and N, which contain these components: 1 kg of feed M contains 100 g of A, 100 g of C, and 200 g of D; 1 kg of feed N contains 100 g of B, 200 g of C, and 100 g of D.

An animal must consume at least 0.4 kg of A per day; 0.6 kg of B; 2 kg of C; and 1.7 kg of D per day. Feed M costs 10 DA per kg, and feed N costs 4 DA per kg.

1) What quantities of feed M and N should be used per day per animal to create the least expensive feed?

Exercise 2.3

A watchmaker makes a profit of 30 DA on each M1 watch and a profit of 10 DA on each M2 watch. To meet seller demand, the daily production of M1 watches should be between 30 and 80, and the daily production of M2 watches between 10 and 30. To maintain good quality, the total number of watches should not exceed 80 per day.

1) How many watches of each type should be produced per day to achieve maximum profit?