(Group 6)
Mehmet ÇANKAYA ***A0078625***
Öner ÜNAL ***A0069480***
Kerem ERZURUMLU ***A0064552***

Problem 3-6 : *A Blending Problem :* Douglas E. Starr, the manager of Heavenly Hound Kennels, Inc., provides lodging for pets. The kennels' dog food is made by mixing three grain products to obtain a well-balanced dog diet. The data for the three products are shown in the following table. If Douglas wants to make sure that each of his dog consumes at least 8 ounces of protein, 1 ounce of carbohydrate, and no more than 0.5 ounces of fat each day, how much of each grain product should each dog be fed in order to minimize Douglas' cost? (*Note:* 16 ounces = 1 pound)

GRAIN PRODUCT	COST PER POUND ($)	PROTEİN (%)	CARBOHYDRATE (%)	FAT (%)
A	0.45	62	5	3
B	0.38	55	10	2
C	0.27	36	20	1

Solution of the problem:

We defined the variables as follows:

X_A : amount of grain product A,
X_B : amount of grain product B,
X_C : amount of grain product C.

Then the model is:

$$\text{Min} : 0.45\,X_A + 0.38\,X_B + 0.27\,X_C$$
$$\text{s.t.} \quad 0.62\,X_A + 0.55\,X_B + 0.36\,X_C \geq 8/16 \quad \text{(minimum protein)}$$
$$0.05\,X_A + 0.10\,X_B + 0.20\,X_C \geq 1/16 \quad \text{(minimum carbohydrate)}$$
$$0.03\,X_A + 0.02\,X_B + 0.01\,X_C \geq 0.5/16 \quad \text{(minimum fat)}$$
$$X_A\,,\ X_B\,,\ X_C \geq 0$$

Note: You can see the solution of the problem in group6_prob06.xls excel document by using the solver.