Assignment One

07.11.2014

CEF 401

We have the problem of scheduling classes in a high school

- Eight classes are to be offered. Every class must be taught.
- There are four teachers and each teacher can teach a maximum of three classes. The lists below show the classes that each teacher can teach.

  Teacher 1: C1, C2, C3, C4.

  Teacher 2: C2, C4, C6, C8.

  Teacher 3: C1, C3, C5, C7.

  Teacher 4: C5, C6, C7, C8.

- There are six periods in the day with two rooms. No more than one class can be scheduled in a room at a time.
- A teacher can teach only one class at a time.

  Construct and solve a network flow model that can be used to assign classes to teachers and teachers to periods.

Course Instructor

Dr. V.B. Mborong

CEF 401 Tutorials 2014

1. A company manufactures two products *X* and *Y*, which require, the following resources. The resources are the capacities machine M_1, M_2, and M_3. The available capacities are 50,25,and 15 hours respectively in the planning period. Product *X* requires 1 hour of machine M_2 and 1 hour of machine M_3. Product *Y* requires 2 hours of machine M_1, 2 hours of machine M_2 and 1 hour of machine M_3. The profit contribution of products *X* and *Y* are 5F- and 4F- respectively. Formulate an LPP of this.

2. A retail store stocks two types of shirts *A* and *B*. These are packed in attractive cardboard boxes. During a week the store can sell a maximum of 400 shirts of type *A* and a maximum of 300 shirts of type *B*. The storage capacity, however, is limited to a maximum of 600 of both types combined. Type *A* shirt fetches a profit of Rs. 2F- per unit and type *B* a profit of 5F- per unit. How many of each type the store should stock per week to maximize the total profit? Formulate a mathematical model of the problem.

3. A ship has three cargo holds, forward, aft and center. The capacity limits are:
Forward 2000 tons, 100,000 cubic meters
Center 3000 tons, 135,000 cubic meters
Aft 1500 tons, 30,000 cubic meters.
The following cargoes are offered, the ship owners may accept all or any part of each commodity:

Commodity	*Amount in tons.*	*Volume/ton in cubic meters*	*Profit per ton in F.*
A	6000	60	60
B	4000	50	80
C	2000	25	50

In order to preserve the trim of the ship the weight in each hold must be proportional to the capacity in tons. How should the cargo be distributed so as to maximize profit? Formulate this as linear programming problem.

4. A patient consult a doctor to check up his ill health. Doctor examines him and advises him that he is having deficiency of two vitamins, vitamin *A* and vitamin *D*. Doctor advises him to consume vitamin *A* and *D* regularly for a period of time so that he can regain his health. Doctor prescribes tonic *X* and tonic *Y*, which are having vitamin *A*, and *D* in certain proportion. Also advises the patient to consume **at least** 40 units of vitamin *A* and 50 units of vitamin Daily. The cost of tonics *X* and *Y* and the proportion of vitamin *A* and *D* that present in *X* and *Y* are given in the table below. Formulate l.p.p. to minimize the cost of tonics.

Vitamins	*Tonics*		*Daily requirement in units.*
	X	*Y*	
A	2	4	40
D	3	2	50
Cost in F. per unit.	5	3	

Dr. V.B. Mborong