International Institute for Technology and Management

January 31st, 2006   # Tutoring Sheet #7

Unit 76: Management Mathematics –Matrices

1. The technology matrix for a two industry input –output model is

   $$A = \begin{pmatrix} 0.3 & 0.1 \\ 0.2 & 0.4 \end{pmatrix}$$

   If the non industry demand for the output for these industries is $d_1 = 2$ and $d_2 = 4$, determine the equilibrium output levels for the three industries.

2. Consider an economy with three industries: coal, electricity and railways. To produce $1 of coal requires $ 0.25 worth of electricity and $ 0.25 rail costs for transportation. To produce $1 of electricity requires $ 0.65 worth of coal for fuel , $ 0.05 of electricity for the auxiliary equipment and $ 0.05 for transport. To provide $ 1 worth of transport ,the railway requires $ 0.55 of coal for fuel $ 0.10 for electricity.
   Each week, the external demands are $50000 for coal, $ 25000 for electricity and no external demand for the railway. What should be the weekly production level for each industry?

3. A small telephone system connects 3 cities.There are four lines between cities 3 and 2,three lines connecting city 3 with city 1 and two lines between cities 1 and 2:
   a. Write a matrix B to represent this information.
   b. Find B^2
   c. How many lines which connect cities 1 and 2 go through exactly one other city?
   d. How many lines which connect cities 1 and 2 go through at most one other city?

4. Study Guide page 117 ,Exercise 7.1

5. Study Guide page 117 ,Exercise 7.2

6. Study Guide page 118 ,Exercise 7.3