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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 $\begin{pmatrix} 0.3 & 0.1 \end{pmatrix}$

$$\mathbf{A} = \begin{pmatrix} 0.0 & 0.1 \\ 0.2 & 0.4 \end{pmatrix}$$

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