EMET1001 Tutorial — Week 13.

Exercise 12.1. Each member of a chess team plays one match with every other player. The results are given in the following table:

PLAYER NAME	DEFEATED
Anne	Diane
Bridget	Anne, Carol, Diane
Carol	Anne
Diane	Carol, Erlene
Erlene	Anne, Bridget, Carol

(a) Express the outcomes as an incidence matrix K by placing a 1 in the ith row and the jth column of K if player i defeated player j and zero otherwise.

(b) Compute the matrix K^2. What does it represent?

(c) Define the vector $B = \begin{bmatrix} 1 \\ 1 \\ 1 \\ 1 \\ 1 \end{bmatrix}$. Compute the matrix products KB and K^2B. What do these matrix products represent?

(d) Compute the matrix $C = K + K^2$. Compute the matrix product CB. What does it represent?

(e) Rank the players from strongest to weakest. Explain the reasoning behind your ranking.

Exercise 12.2. The equilibrium levels of consumption, C, and income, Y, for the simple two-sector macroeconomic model satisfy the structural equations

$$Y = C + I^*$$
$$C = aY + b,$$

where a and b are parameters in the range $0 < a < 1$ and $b > 0$, and I^* denotes investment. Express this system in matrix form and hence express Y and C in terms of a, b, and I^*. Give an economic interpretation of the inverse matrix.

Related exercises in the textbook you should study, include (but are not limited to):

Exercises 4.4 — Problems 1-74

Exercises 4.5 — Problems 1-36, 41-50, 61-68

The tutors at the EMET1001 help desk are happy to help, if you have any questions.