

HOMEWORK 4 - DUE WED, NOV. 3

1.) Let G be a graph with four nodes - A,B,C,D. There is one edge from A to B, C, D, one edge from B to A, C, one edge from C to A, D, and one edge from D to A.

- a) Write down the incidence matrix M of G .
- b) Compute the number of three-step paths from A to D by considering a suitable power of M .

2.) Consider the transformation $T : \mathbb{R}^4 \mapsto \mathbb{R}^2$ given by

$$T(x_1, x_2, x_3, x_4) = (x_2 + 3x_4 - x_1, x_2 - x_4)$$

- a) Show that T is a linear transformation.
- b) Write down the matrix A_T representing T .

3.) Let T be a linear transformation $T : \mathbb{R}^3 \mapsto \mathbb{R}^2$ such that

$$T(1, 1, 0) = (1, -1, 3), \quad T(0, 3, 1) = (2, 0, 1), \quad T(1, 2, 0) = (-1, 1, 3)$$

Write down the matrix A_T representing T and compute $T(1, 1, 1)$.

4.) Use linear transformations to find the equation of the parabola passing through $(1, 1)$, $(1, 2)$ and $(2, 1)$ whose axis of symmetry is the line $y = x$.