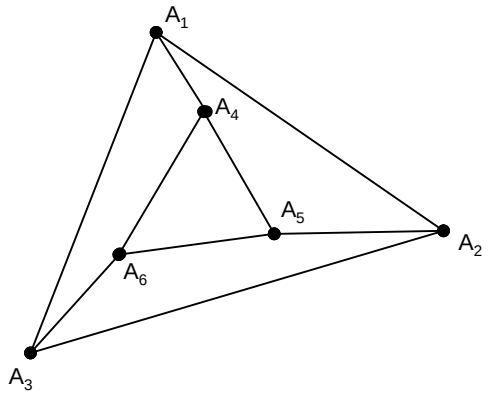
Graph-Theoretic Methods

Homework #1 (2020-2021), Questions

Q1: Graph Laplacians

Consider the following graph.



A. Write its graph Laplacian L.

B. Based on the symmetry of the graph, write a permutation matrix $P \neq I$ that commutes with L, for which $P^3 = I$.

C. Determine the eigenvalues and eigenvectors of P.

D. Using $PL = LP$, determine the eigenvectors and eigenvalues of L.