

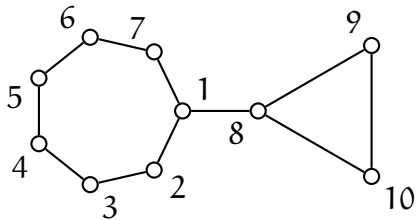
Math589 Homework 8

Note: To submit the k-th homework, simply put your files in the folder HWk on CoCalc, and it will be collected on the due day.

1. Let G be the graph drawn below. Find a balanced partition

$$V(G) = X_1 \cup X_2 \text{ with } |X_1| = |X_2|$$

that minimizes the number of edges between X_1 and X_2 .



2. Let G be the same graph as in Problem 1. Let \mathbf{v} be the eigenvector corresponding to the second (smallest) eigenvalue. Find

$$\text{supp}_+(\mathbf{v}) := \{i \in V(G) : (\mathbf{v})_i > 0\},$$

$$\text{supp}_-(\mathbf{v}) := \{i \in V(G) : (\mathbf{v})_i < 0\},$$

$$\text{supp}_0(\mathbf{v}) := \{i \in V(G) : (\mathbf{v})_i = 0\}.$$

You may use a computer if necessary.