CSE 640 HW #3

(due Nov 18th; 3:00pm)

Homeworks are to be done **individually***. Show your work and explain any assumption you make. Please use an editor, submissions with hand-writing will not be accepted. Upload your work as a single pdf file to AutoLab. Have fun!*

1. **(50 pts)** Consider the graph in Figure 1 (it's the same graph in HW-2) and apply partitioning based on the following constraints;

   (a) **(15 pts)** Partition the **nodes** into two parts such that partitions have the same number of nodes and the edge cut is minimized. Give the nodes in each partition and also mention the edge cut.

   (b) **(15 pts)** Partition the **nodes** into four parts such that the size of each is either 4 or 5 nodes and the total edge cut is minimized. Give the nodes in each partition and also mention the edge cut.

   (c) **(20 pts)** Partition the **edges** into three parts such that the size of each is at least 6 nodes and the number of replicated nodes are minimized. Give the edges in each partition and also mention the number of replicated nodes.
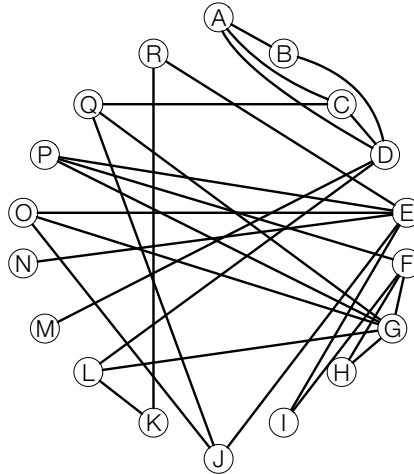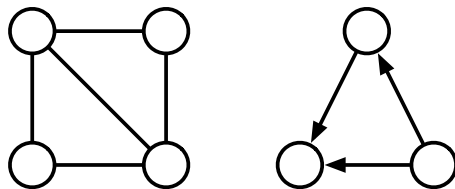

Figure 1: Toy graph

Figure 2: Motifs

2. **(30 pts)** Consider the undirected motif in Figure 2 [left] for the `bison` network attached.

  (a) **(10 pts)** Give the number of induced motifs.

  (b) **(10 pts)** Give the number of non-induced motifs.

  (c) **(10 pts)** Compute the induced motif counts per each node. Find the top five nodes with the largest count; give their ids and counts.

3. **(20 pts)** Consider the directed motif in Figure 2 [right] for the `jazz` network attached.

  (a) **(10 pts)** Give the number of induced motifs.

  (b) **(10 pts)** Compute the induced motif counts per each node. Find the top five nodes with the largest count; give their ids and counts.