

## CS 6301 Implementation of data structures and algorithms

### Long Project 5: Flow and Postman Tour

Ver 1.0: Initial description (April 17<sup>th</sup>).

**Due: 11:59 PM, Sun, May 3<sup>rd</sup> for part a, and Sun, May 10<sup>th</sup> for parts b and c.**

Max excellence credits: 2.0.

Submission procedure is the same as that of prior projects.

This project has three parts. Part b and c are optional. Successful implementation of part b and part c can earn you 2 excellence credits. Starter code, driver code for each part and test cases are provided.

- a. Implement preflow-push algorithm discussed in the class.
- b. Implement cost scaling min cost flow algorithm discussed in the class. (EC: 1)
- c. Implement the algorithm discussed in the class for finding an optimal Postman tour in a given directed graph. (EC: 1)

As discussed in the class it is not efficient to construct the residual graph and update it after each push. Instead, calculate residual capacity of an edge on the fly. Also, note that the test cases may contain both edges  $(i, j)$  and  $(j, i)$  for some  $i, j$ . So, do not assume that if  $(i, j)$  is in  $E$ , then  $(j, i)$  will not be in  $E$ . Residual capacity of edge  $(u, v) = c(u, v) - f(u, v) + f(v, u)$ .