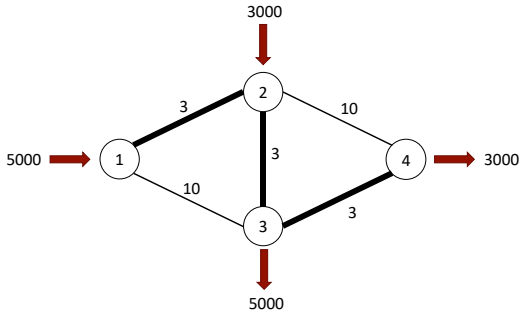
Shanghai Jiao Tong University ECE4530J

Mini Project 2: Due 2023.7.12

Consider the undirected network in the figure below. Links (1,2), (2,3), (3,4) are highways with a capacity of 6000 veh/hr and a travel time of 3 min. Links (1,3), (2,4) are local streets with a capacity of 3000 veh/hr and a travel time of 10 min. The traffic demand is indicated in the figure as well (unit: veh/hr). We want to allocate the traffic flows to minimize the average travel time for all vehicles.



a) Suppose that we do not differentiate traffic according to their origin-destination (OD) information. Formulate the min-cost flow problem. Solve it using a coding language of your choice.

b) Now, suppose that every vehicle entering the network at node 1 (resp. 2) must exit through node 3 (resp. 4). Formulate the min-cost flow problem. Solve it using a coding language of your choice.

Please attach your codes at the end of the PDF of your response.

Tools and tutorials for linear optimization:

Python:

- https://blog.csdn.net/weixin_44211968/article/details/123544653
- https://docs.scipy.org/doc/scipy/reference/generated/scipy.optimize.linprog.html

MATLAB:

https://ww2.mathworks.cn/help/optim/ug/linear-programming-with-equalities-and-inequalities.html?searchHighlight=linear%20programming&s_tid=srchtitle_linear%20programming_2