

Homework 12: Graphs part 3**Problems**

1. (20 pts) Exercise 24.1-3.
2. (20 pts) Exercise 24.1-4.
3. (20 pts) Exercise 24.2-2.
4. (20 pts) Exercise 24.2-10 (Extra Credit)
5. (30 pts) Implement Push-Relabel for finding maximum flow. Discharge procedure is required: when you select a vertex u , Push () and Relabel() until its excess is 0. But you can choose vertices in any order.
Extra Credit: Use relabel-to-front idea from Chapter 26.5 (3rd edition), with the global list L managing the vertices order. L is a topological sort of the “admissible edges” , these are the push-ready-edges with residual capacity positive, and heights at difference 1.
6. (15 pts) Explain in a brief paragraph the following sentence from textbook page 737 (3rd edition): “To make the preflow a “legal” flow, the algorithm then sends the excess collected in the reservoirs of overflowing vertices back to the source by continuing to relabel vertices to above the fixed height $|V|$ of the source”.
7. (20 pts Extra Credit) Exercise 26.4-4 (3rd edition): Suppose that we have found a maximum flow in a flow network $G = (V, E)$ using a push-relabel algorithm. Give a fast algorithm to find a minimum cut in G .