

Math 382

Homework 10

Due Friday, April 29

1. Problem 24-3 from the book.
2. As stated, the Floyd-Warshall algorithm takes $O(n^3)$ space. How can we reduce this?
3. Say that we modify the graphs in the maximum flow problem. They now have *vertex capacities* as well as edge capacities. We say the flow going through a given vertex is equal to the total flow coming into it (or going out of it). Now we require that the flow through a vertex never exceed that vertex's capacity. Show how to transform a graph $G = (V, E)$ with vertex capacities into an equivalent graph $G' = (V', E')$ of the kind we discussed in class, where vertices don't have capacities. ("Equivalent" here means that it has the same maximum flow.) Your transformation should be efficient, so that one could easily solve the new problem by converting the graph G to G' and then running a maximum flow algorithm we already know on G' . How do the sizes of V' and E' relate to the sizes of V and E ?
4. Problem 26-3 from the book.
5. Problem 26-4 from the book.