Name ———————————————- SSN ————————————————-

1. (20%) For the following weighted, directed graph

   - run FASTER-ALL-PARIS-SHORTEST-PATHS algorithm.

   - run FLOYD-WARSHELL algorithm.
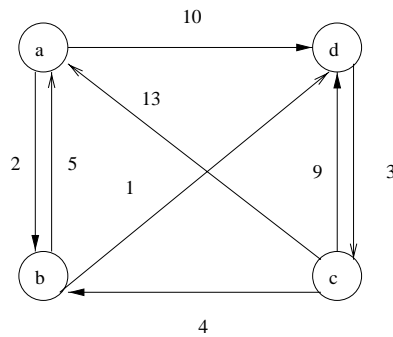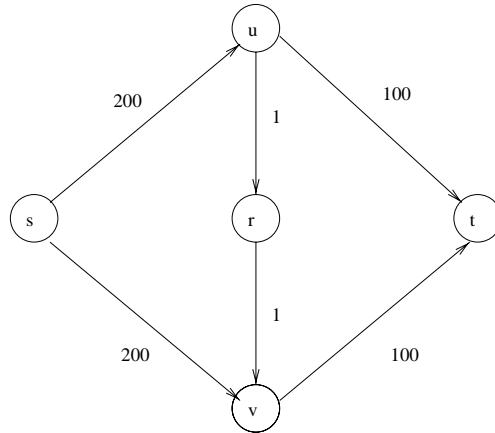
(question 1, continued)

2. (20%)

- Modify the EXTEND-SHORTEST-PATHS and SLOW-ALL-PAIRS-SHORTEST-PATHS to calculate the transitive closure of a graph.

- Find the transitive closure of the following graph using the modified algorithm. Show all the steps.
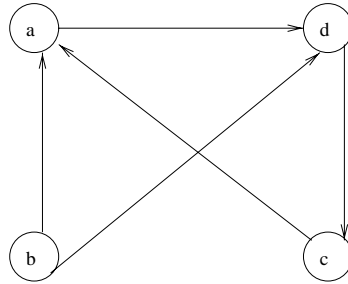
(question 2, continued)

3. (25%) Apply the Ford-Fulkerson method to the following network. Show **residual networks, augmenting paths**, **final cut**, and **total flow**. The following two searching algorithms are used. The priority orders of nodes are r, s, t, u, and v.

- Depth-first search
- Breadth-first search

v

(question 3, continued)

4. (15%) Suppose $\sum = \{a, b\}$, build an automaton A that accepts those strings that end in ab and have even number of occurrences of ab. For example, A accepts $aababababaab$, $abab$, and $aaabbab$, but rejects $aababab$, $ababa$, and $ababbb$.

5. (20%)

- Compute the prefix function π for the pattern *ababa* when the alphebet is $\sum = \{a, b\}$.

- Use Knuth-Morris-Pratt algorithm to detect pattern $P = ababa$ in string *ababbababababa*. Show all the necessary shifts.

(question 5, continued)