**Algorithm 2021 Spring HW4**

(15pts)1. Use Dijkstra’s algorithm to find the shortest paths from vertex to other vertices. (You need to show your process.)

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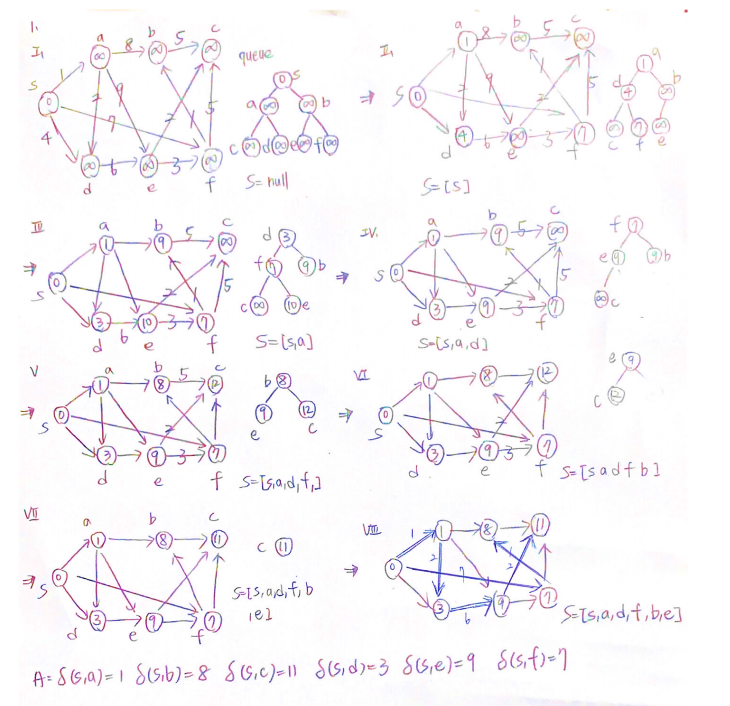
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(10pts)2. Given the DFS code below, please fill in the blanks.

***DFS(G):***

1. for each vertex u ∈ G.V

2. u.color = WHITE

3. u.π = NIL

4. time = 0

5. for each vertex u ∈ G.V

6. if u.color == WHITE

7. DFS-VISIT(G, u)

***DFS-VISIT (G, u):***

1. time = time + 1

2. u.d = time

3. u.color = GRAY

4. for each vertex v ∈ G.Adj[u]

5. if

6. print "(u, v) is a tree edge."

7. v.π = u

8. DFS-VISIT (G, v)

9. else if

10. print "(u, v) is a back edge."

11. else if

12. print "(u, v) is a forward edge."

13. else

14. print "(u, v) is a cross edge."

15. u.color = BLACK

16. time = time + 1

17. u.f = time

(1) v.color==WHITE

(2) v.color==GRAY

(3) v.color==BLACK

(25pts)3. Given a set of requests request corresponds an interval with start time and finish time ie. Interval i: .

1. Please give a greedy algorithm to partition these requests into a minimum number of compatible subsets, each corresponds to one resource. (hint: A subset of intervals is compatible if no two intervals overlap)
2. Please prove that your greedy algorithm is correct and optimal.

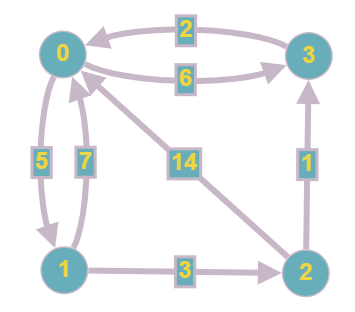
(a)

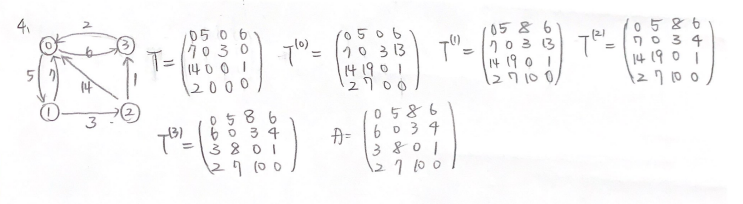
Call greedy activity selector, let S={1,2,3,…,n} be i th request. Use S run greedy activity selector, then we have maximum subset , and let S=S-. Then, use new S to do greedy activity selector and we get . Keep doing until , then we will have , k is the minimum number of compatible subset.

(b)

Since is the maximum subset of S, we must have events in S- all overlap with some events in , because if not, we can put that event into , and that contradiction that is the maximum subset of each for will be the maximum subset of S, and since we have all these subsets is the minimum number of compatible subsets and that is k.

(10pts)4. Find all pairs shortest path using Floyd-Warshall.





(15pts)5. There are five cities in a network. The cost of building a road directly

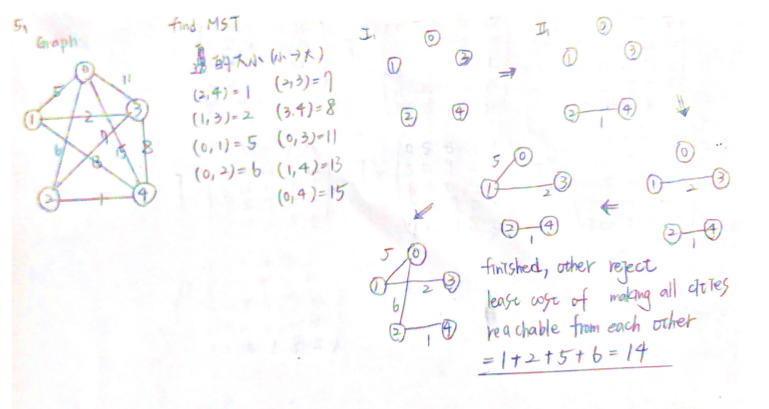
between and is the entry in the matrix below. An infinite entry indicates

that there is a mountain in the way and the road cannot be built. Determine the

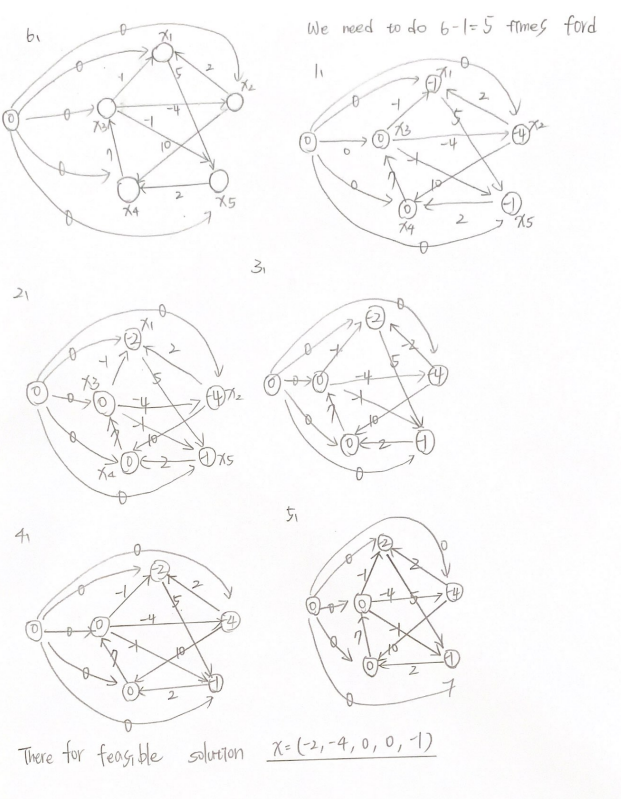
least cost of making all the cities reachable from each other.

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自動產生的描述



(15pts)6. Find a feasible solution or determine that no feasible solution exists for the following system of difference constraints:



(10pts)7. Reweight the edges using the method used in Johnson’s algorithm.

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