Thank you for taking the Week 9: Assignment 9.

Week 9: Assignment 9

Your last recorded submission was on 2023-03-29, 17:16 IST **Due date: 2023-03-29, 23:59 IST.**

1) In a flow network, the maximum flow is equal to the minimum cut. ***1 point***

- (●) True
- ( ) False

2) Which of the following is true about a minimum cut in a network? ***1 point***

- ( ) It is the cut that separates the source and the sink with the minimum number of edges.
- ( ) It is the cut that separates the source and the sink with the maximum sum of capacities of the edges.
- (●) It is the cut that separates the source and the sink with the minimum sum of capacities of the edges.
- ( ) All of the above

3) You need to remove some of the edges from the below given graph G to make the vertices s and t disconnected. The cost of removing edges is equal to the sum of capacities of those edges. What will be the minimum cost to make s and t disconnected?

Assessment submitted.
X

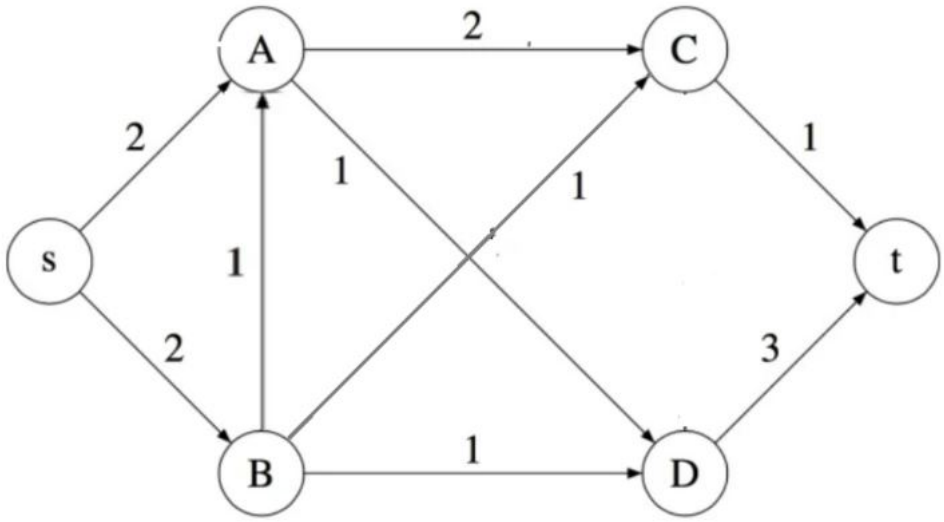
unit=89&lesson=91)
- Sam I AM and Vertex Covers (unit? unit=89&lesson=92)
- Practice: Week 9: Assignment 9 (Non Graded) (assessment? name=153)
- Week 9 Feedback Form: Getting Started with Competitive Programming (unit? unit=89&lesson=172)
- **Quiz: Week 9: Assignment 9 (assessment? name=220)**
- Week 9: Practice Programming Assignment 1 (/noc23_cs30/progassignment? name=221)
- Week 9 Programming Assignment Q1 (/noc23_cs30/progassignment? name=222)

Week 10 ()

Download Videos ()

Live Sessions ()

Transcripts ()



3

1 point

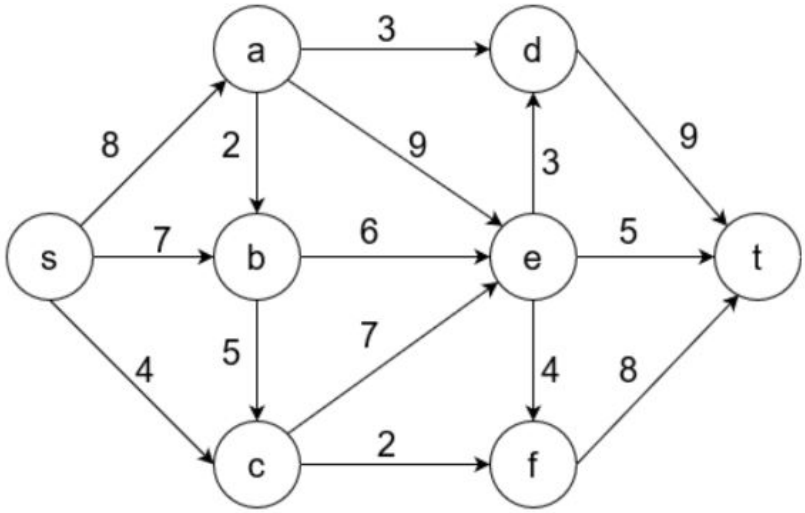
4) Consider the undirected graph G given in the **Question 3**. We want to increase the flow from the vertex s to t. An edge is called a bottleneck edge if the flow from s to t increases upon increasing the capacity of that edge. Select the bottleneck edge(s) from the below given options. ***1 point***

Note: If there are multiple bottleneck edges in the given options then select all of them.

- [ ] (B,C)
- [x] (A,D)
- [x] (B,D)
- [ ] (B, A)

5) Consider the network given below with source s and sink t, with the numbers on the edges denoting maximum capacity across a particular edge. ***1 point***

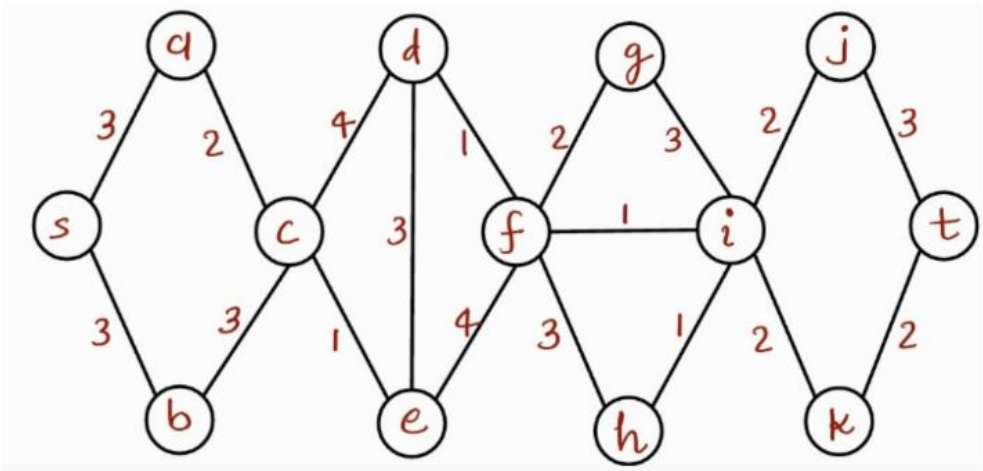
Assessment submitted.
X



Which of the following edges form a **valid min cut** in the given network?

- (●) Edges $\{ad, ed, et, ef, cf\}$
- ( ) Edges $\{ad, ae, be, ce, cf\}$
- ( ) Edges $\{ad, ed, et, ft\}$
- ( ) Edges $\{dt, ed, et, ef, cf\}$

6) You need to remove some of the edges from the below given graph G to make the vertices s and t disconnected. The cost of removing edges is equal to the sum of capacities of those edges. ***1 point***



Which of the following edges set(s) make s and t disconnected with minimum cost?

- [x] Edges $\{ij, ik\}$
- [ ] Edges $\{fi, hi, ij\}$
- [ ] Edges $\{ce, df, de\}$
- [x]

Assessment submitted.
X

Edges $\{fg, fi, hi\}$

7) Recall that, an (s, t) - cut is a partition of the vertices into disjoint subsets S and T such that $S \cup T = V$ and $S \cap T = \emptyset$, where $s \in S$ and $t \in T$. The capacity of a cut is the sum of the capacities of the edges that start in S and end in T. ***1 point***

Let $G(V, E)$ be an undirected graph with V as the vertex set an E as the edge set. Let (S, T) and (S', T') be the minimum (s, t) - cuts in G. Which of the following statement(s) is/are correct?

I) $(S \cap S', T \cup T')$ is also a min (s, t) - cut in G.
II) $(S \cup S', T \cap T')$ is also a min (s, t) - cut in G.

- ○ Only statement (I) is Correct
- ○ Only statement (II) is Correct
- ◉ Both are Correct
- ○ Both are Incorrect

You have been given a $R \times C$ chessboard, with a list of squares cut out. This problem will involve placing rooks on a chessboard, so that they cannot attack each other. For a rook to attack a target piece, it must share the same row or column as the target. Find the maximum number of rooks that can be placed on the chessboard, such that no pair of rooks can attack each other. Rooks cannot be placed on cut out squares. The cut out squares do not affect where the rooks can attack.

8) What is the answer if $R = C = N$ and there are no cut out squares? ***1 point***

- ○ $\lfloor N/2 \rfloor$
- ○ $\lceil N/2 \rceil$
- ◉ N
- ○ N^2

9) What is the **number of valid placements** (i.e, number of distinct solutions) if $R = C = N$ and there are no cut out squares? Two solutions are distinct if there is at least one square which has a rook in one of them and does not have a rook in the other. ***1 point***

- ○ N
- ○ 2^N
- ○ N^2
- ◉ $N!$

You may submit any number of times before the due date. The final submission will be considered for grading.

Submit Answers

Assessment submitted.
X