Maxflow and Mincut

1/3 points earned (33%)

You haven't passed yet. You need at least 66% to pass.
Review the material and try again! You have 3 attempts every 8 hours.

Review Related Lesson

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1 / 1
points

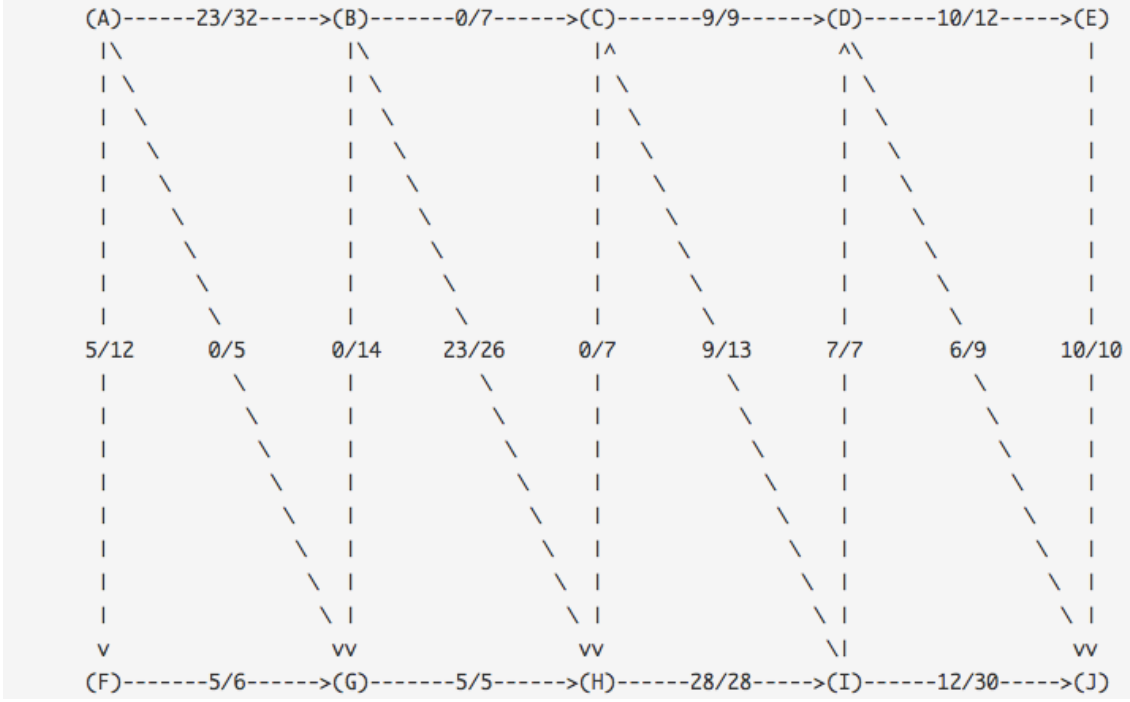
1.

```
(seed = 453695)
Suppose that you are computing a max flow from the source vertex A to
the sink vertex J in the flow network given below:

    edge   flow  /  capacity
    ------------------------
    A->B     23  /  32
    A->F      5  /  12
    A->G      0  /   5
    B->C      0  /   7
    B->G      0  /  14
    B->H     23  /  26
    C->D      9  /   9
    C->H      0  /   7
    D->E     10  /  12
    D->J      6  /   9
    E->J     10  /  10
    F->G      5  /   6
    G->H      5  /   5
    H->I     28  /  28
    I->C      9  /  13
    I->D      7  /   7
    I->J     12  /  30

```

Here is a graphical representation of the same flow network:



Starting from the given flow (of value 28), give the sequence of vertices in the next (and final) augmenting path discovered by the Ford-Fulkerson algorithm.

A B C I J

Correct Response

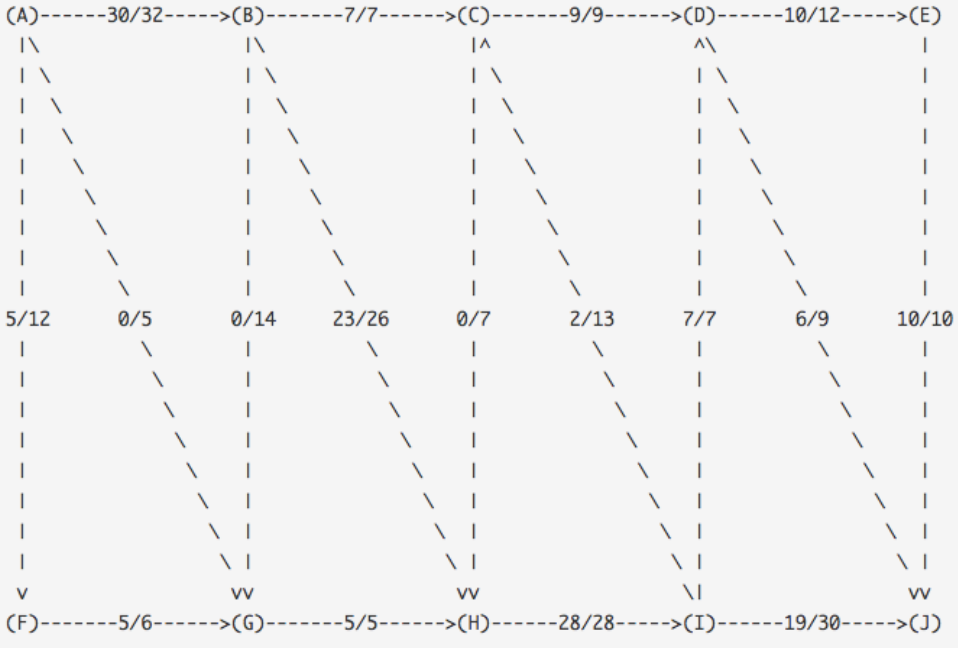
```
The correct answer is: A B C I J


augmenting path:     A->B->C->I->J
bottleneck capacity: 7
value of flow:       35

Here is the final flow network:

    edge   flow  /  capacity
    ------------------------
    A->B     30  /  32
    A->F      5  /  12
    A->G      0  /   5
    B->C      7  /   7
    B->G      0  /  14
    B->H     23  /  26
    C->D      9  /   9
    C->H      0  /   7
    D->E     10  /  12
    D->J      6  /   9
    E->J     10  /  10
    F->G      5  /   6
    G->H      5  /   5
    H->I     28  /  28
    I->C      2  /  13
    I->D      7  /   7
    I->J     19  /  30
```

Here is a graphical representation of the final flow network:

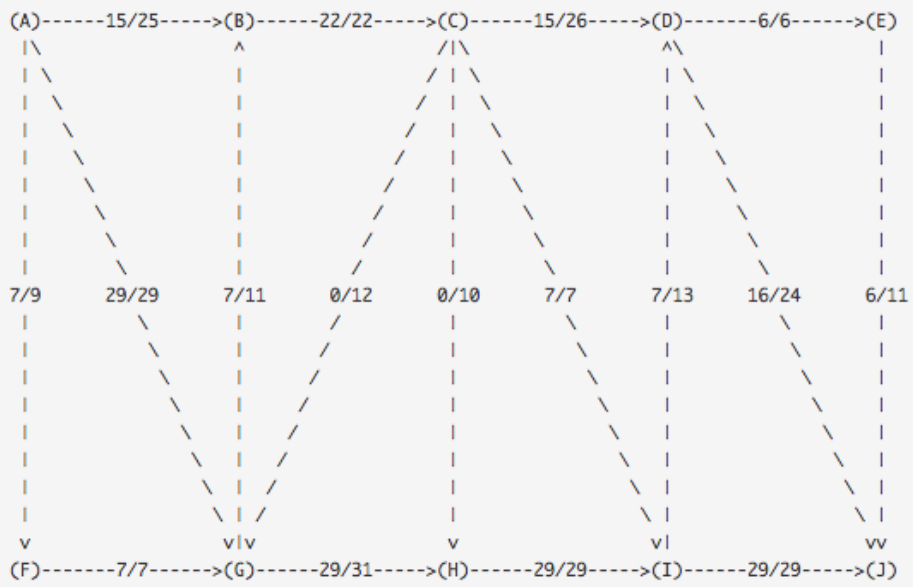


0 / 1 points

(seed = 979780)
Consider the flow network with 10 vertices and 17 edges:

edge	flow	/	capacity
A->F	7	/	9
A->G	29	/	29
A->B	15	/	25
G->B	7	/	11
B->C	22	/	22
C->H	0	/	10
C->I	7	/	7
C->D	15	/	26
C->G	0	/	12
I->D	7	/	13
D->E	6	/	6
D->J	16	/	24
E->J	6	/	11
F->G	7	/	7
G->H	29	/	31
H->I	29	/	29
I->J	29	/	29

Here is a graphical representation of the same flow network:



The flow given above is a maxflow from A to J. What is the corresponding mincut?
List the vertices on the s side of mincut in alphabetical order.

2.

A B G H

Incorrect Response

The correct answer is: A B F G H

min cut: A B F G H

value of flow: 51

capacity of cut: 51

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0 / 1 points

3.
(seed = 709661)

Which of the following statements about maxflow and mincut are guaranteed to be true in any flow network G? Check all that apply. As usual, we use the term maxflow to refer to an st-maxflow and mincut to refer to an st-mincut and we assume the network is directed.

- [ ] The value of any flow is greater than or equal to the capacity of any cut.

Un-selected is correct

- [x] If the capacity of some cut (A, B) equals the value of some flow f, then f is a maxflow.

Correct
This follows from weak duality, which asserts that the value of any flow is less than or equal to the capacity of any cut.

- [x] If there are two different integer-valued maxflows f and f', then there is a third integer-valued maxflow f'' (different from both f and f').

This should not be selected
Consider a network with these edges and capacities: s->v (1), v->w (1), w->t (1), v->x (1), x->t (1). There are exactly two integer-valued maxflows: either send 1 unit of flow along the path s->v->w->t or send 1 unit of flow along the path s->v->x->t.

- [ ] Let G be an arbitrary graph (not necessarily bipartite). Then, G has a perfect matching if and only if for every subset S of vertices, there are at least |S| neighboring vertices. (A vertex neighbors S if at least of its endpoints is in S.)

Un-selected is correct

- [x] If all edge capacities are 1, then the number of augmentations in the generic Ford-Fulkerson algorithm is at most E.

Correct