Maxflow and Mincut

Back to Week 3

2/3 points earned (66%)

Quiz passed!

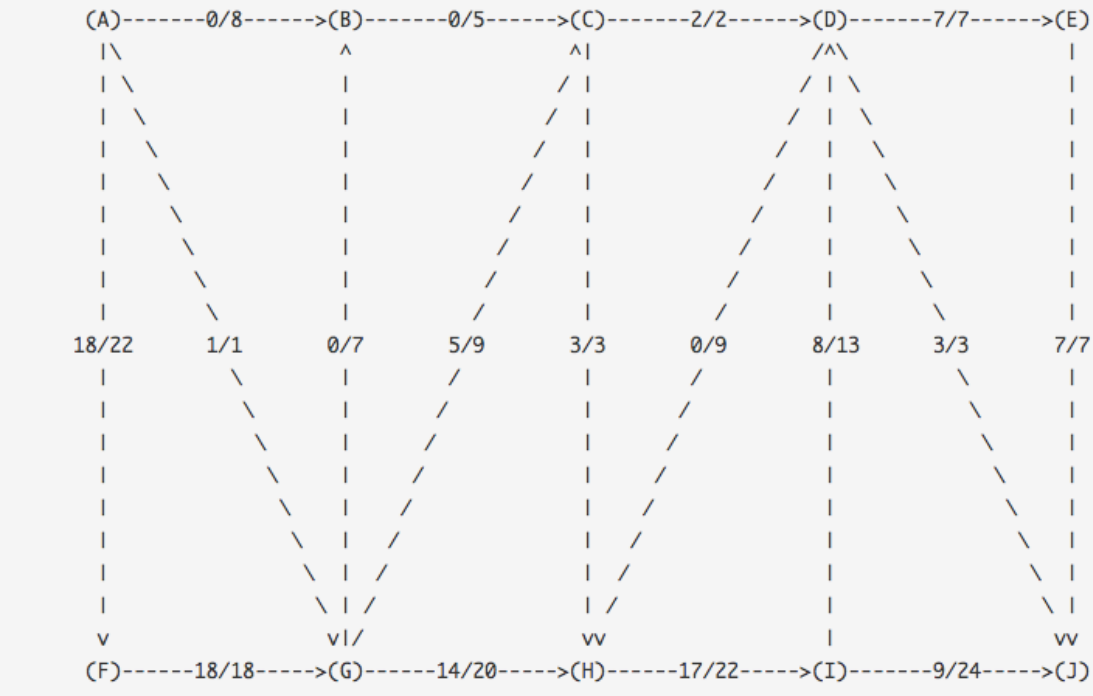
1 / 1
points

1.
(seed = 943349)

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      0  /   8
A->F     18  /  22
A->G      1  /   1
B->C      0  /   5
C->D      2  /   2
C->H      3  /   3
D->E      7  /   7
D->H      0  /   9
D->J      3  /   3
E->J      7  /   7
F->G     18  /  18
G->B      0  /   7
G->C      5  /   9
G->H     14  /  20
H->I     17  /  22
I->D      8  /  13
I->J      9  /  24
```

Here is a graphical representation of the same flow network:



Starting from the given flow (of value 19), give the sequence of vertices in the next (and final) augmenting path discovered by the Ford-Fulkerson algorithm.

A B C G H I J

Correct Response

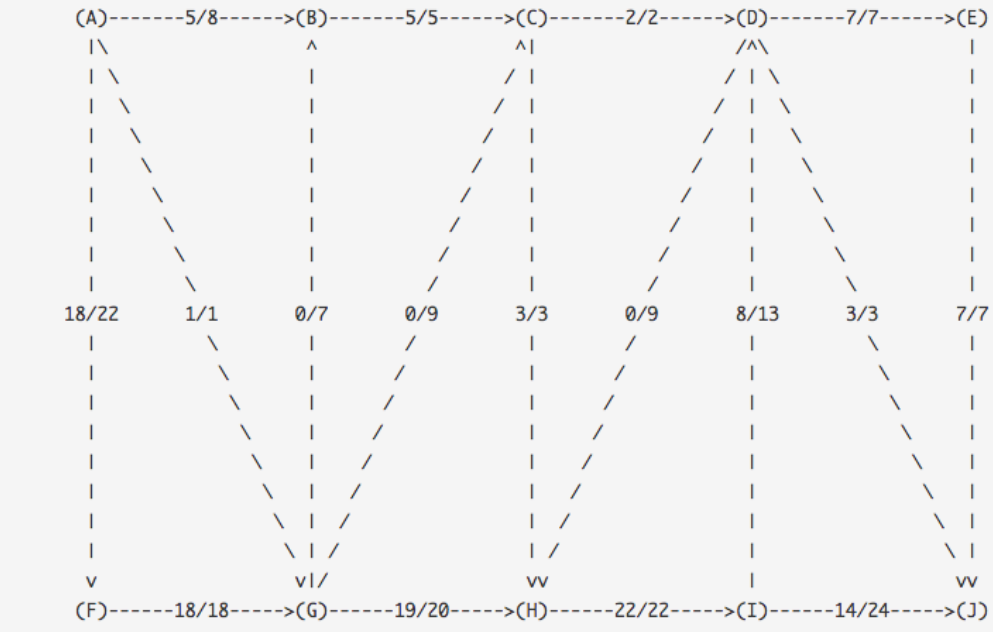
```
The correct answer is: A B C G H I J


augmenting path:     A->B->C->G->H->I->J
bottleneck capacity: 5
value of flow:       24

Here is the final flow network:

    edge   flow  /  capacity
    ------------------------
    A->B      5  /   8
    A->F     18  /  22
    A->G      1  /   1
    B->C      5  /   5
    C->D      2  /   2
    C->H      3  /   3
    D->E      7  /   7
    D->H      0  /   9
    D->J      3  /   3
    E->J      7  /   7
    F->G     18  /  18
    G->B      0  /   7
    G->C      0  /   9
    G->H     19  /  20
    H->I     22  /  22
    I->D      8  /  13
    I->J     14  /  24
```

Here is a graphical representation of the final flow network:



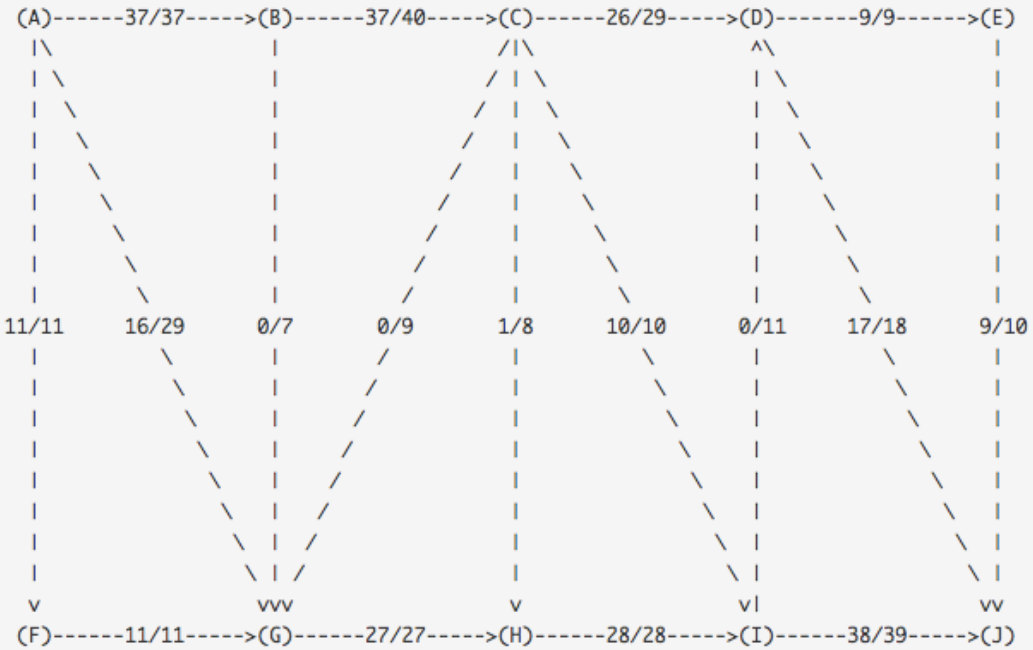
1 / 1
points

2.

(seed = 50828)
Consider the flow network with 10 vertices and 17 edges:

edge	flow	/	capacity
A->B	37	/	37
A->F	11	/	11
A->G	16	/	29
B->C	37	/	40
B->G	0	/	7
C->I	10	/	10
C->G	0	/	9
C->H	1	/	8
C->D	26	/	29
I->D	0	/	11
D->E	9	/	9
D->J	17	/	18
E->J	9	/	10
F->G	11	/	11
G->H	27	/	27
H->I	28	/	28
I->J	38	/	39

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.

A F G

Correct Response
The correct answer is: A F G

min cut: A F G

value of flow: 64

capacity of cut: 64

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0 / 1
points

3.
(seed = 90120)

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.

- [x] The net flow leaving the source s equals the net flow entering the sink t.

Correct
This is an immediately corollary of the flow-value lemma.

- [ ] Let f be any flow and let (A, B) be any cut. Then, the net flow across the cut (A, B) equals the value of the flow f.

This should be selected

- [x] Suppose there is an augmenting path with respect to flow f. Then, f is not a maxflow.

Correct
Can increase the value of the flow by changing the flow along each edge in the augmenting path.

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

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.

- [ ]