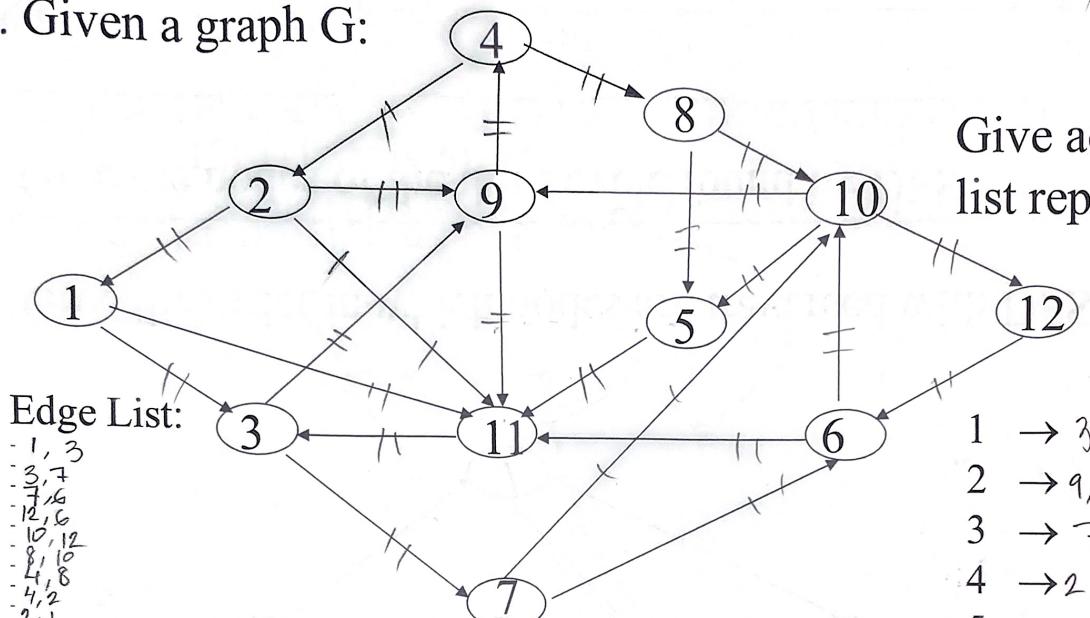


(98)

1. Given a graph G:

(10)



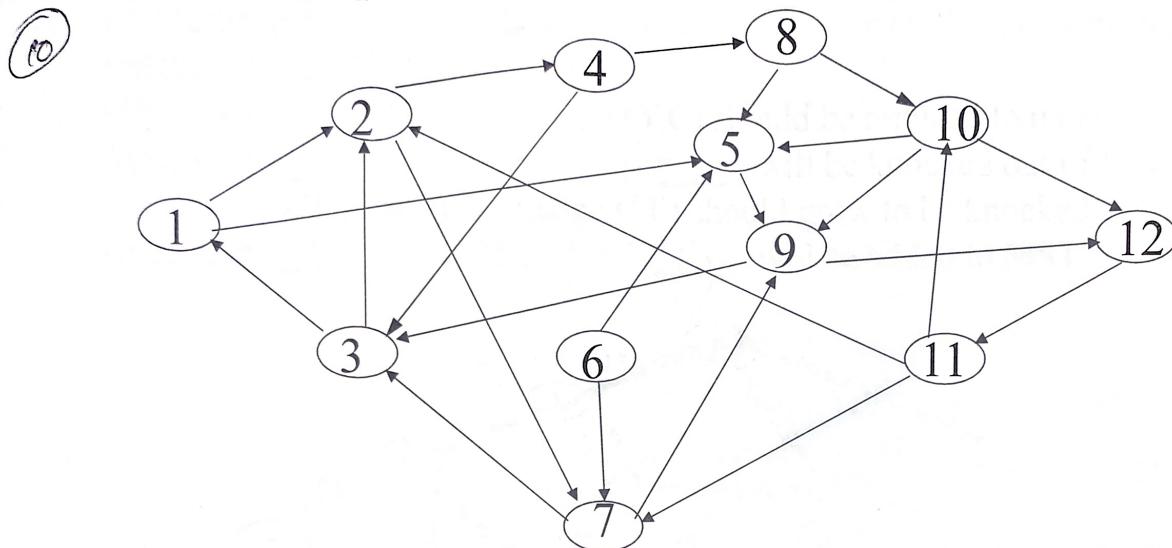
Edge List:

- 1, 3
- 3, 7
- 7, 6
- 12, 6
- 10, 12
- 8, 10
- 4, 8
- 4, 2
- 2, 1
- 2, 11
- 2, 9
- 3, 9
- 11, 3
- 6, 11
- 6, 10
- 10, 5
- 10, 9
- 8, 5
- 5, 11
- 7, 10
- 9, 11
- 9, 4
- 1, 11

Give adjacency  
list representation:

- 1 → 3, 11
- 2 → 9, 11, 1
- 3 → 7, 9
- 4 → 2, 8
- 5 → 11
- 6 → 10, 11
- 7 → 10, 6
- 8 → 10, 5
- 9 → 4, 11
- 10 → 5, 12
- 11 → 3
- 12 → 6

2. Given a graph G:



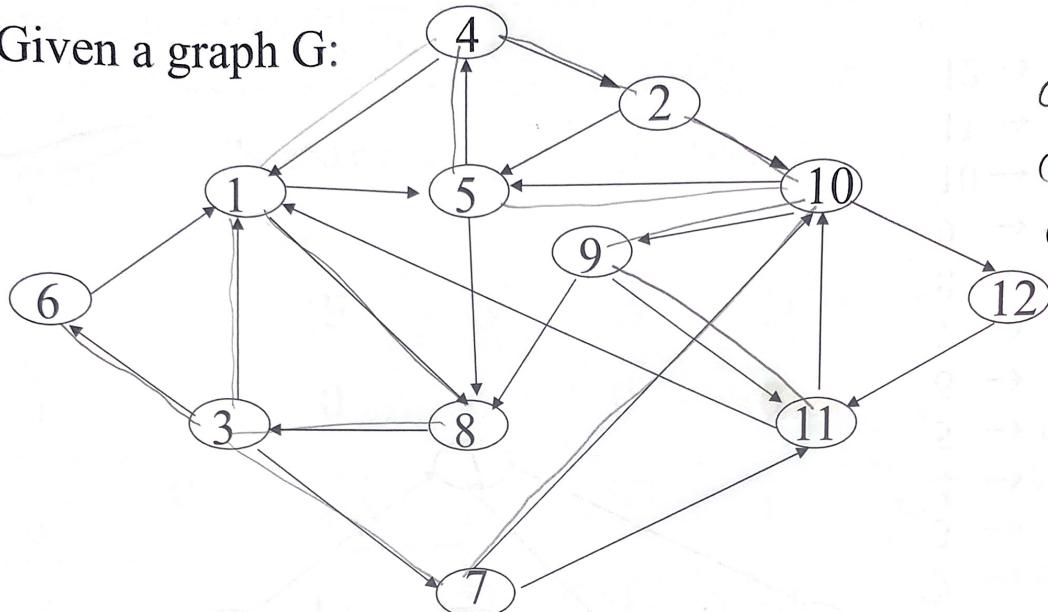
Give the order in which nodes are traversed with BFS

from source 2: 2, 1, 7, 3, 8, 9, 1, 5, 10, 12, 11, 6

from source 1: 1, 2, 5, 4, 7, 9, 3, 8, 12, 10, 11, 6

3. Given a graph G:

(10)



Cycle 1: 1, 8, 3, 1

Cycle 2: 1, 8, 3, 6, 1

Cycle 3: 1, 8, 3, 7, 10, 5, 4, 1

Give the order in which nodes are traversed with DFS

1, 8, 3, 6, 7, 10, 5, 4, 2, 9, 11, 12

Give the nodes of the third cycle found by DFS

1, 8, 3, 7, 10, 5, 4, 1

4. Given a graph below

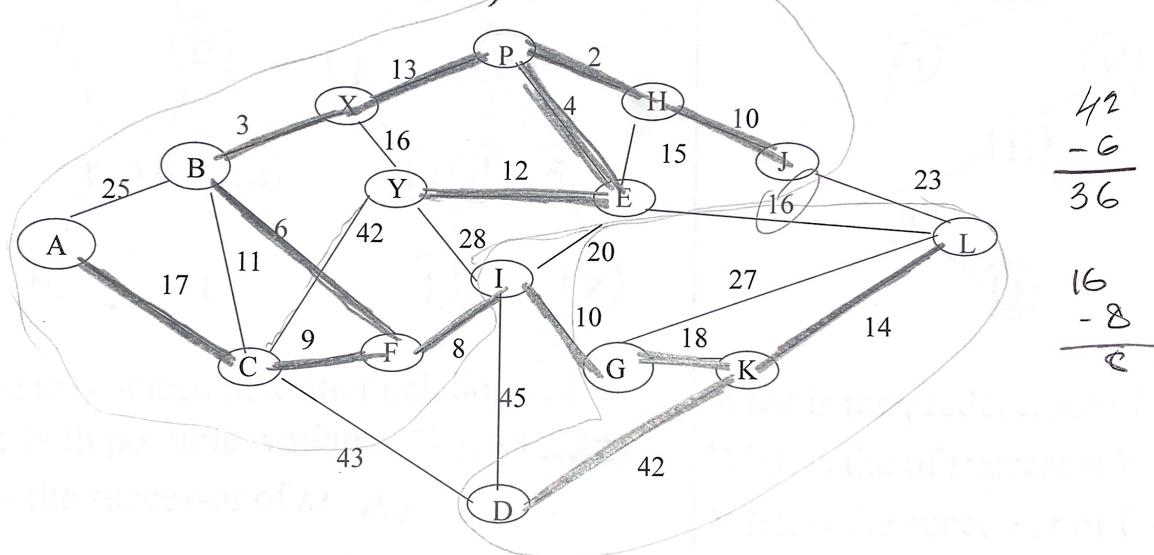
What are the neighbors in the minimum spanning tree (MST) of the node K G, L, D and the node Y E

- By how much the weight of edge (Y,C) should be reduced to make this edge added to MST?

At least by 36. The edge (F,B) will be knocked out of MST.

- By how much the weight of edge (I,F) should grow to be knocked out of MST?

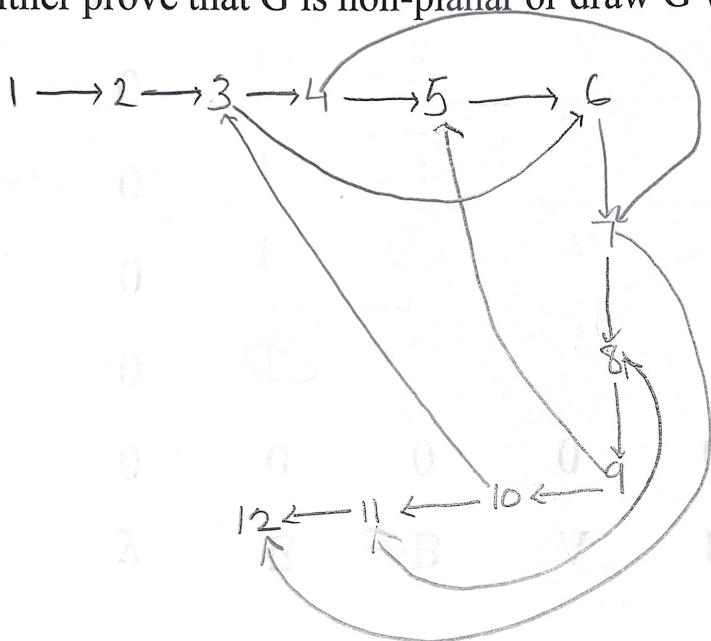
At least by 8. The edge (E,L) will be added to MST



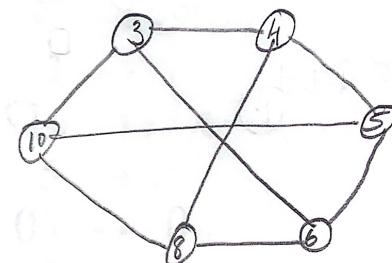
5. For the following graph G with edges

(1,2), (2,3), (3,4), (4,5), (5,6), (6,7), (7,8), (8,9), (9,10), (10,11), (11,12), (10,3),  
(3,6), (7,12), (11,8), (9,5), (4,7)

either prove that G is non-planar or draw G without self-intersections



3 4 5 6 8 10 11

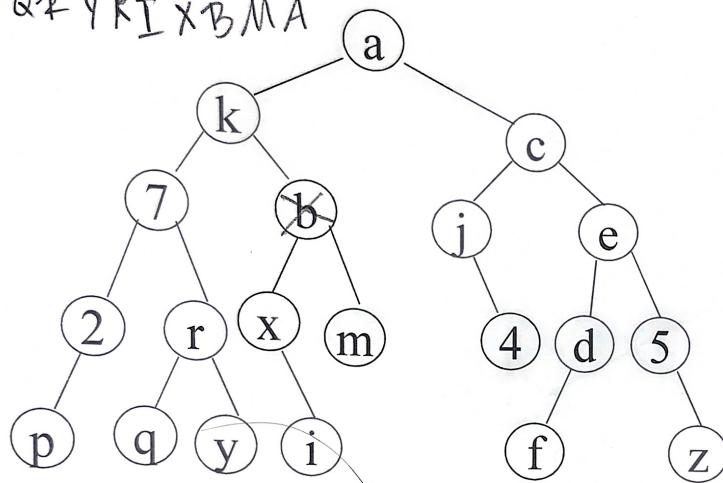


G is non-planar by K5

(18)

## 6. Given Binary Search Trees

P L T Q R Y K I X B M A

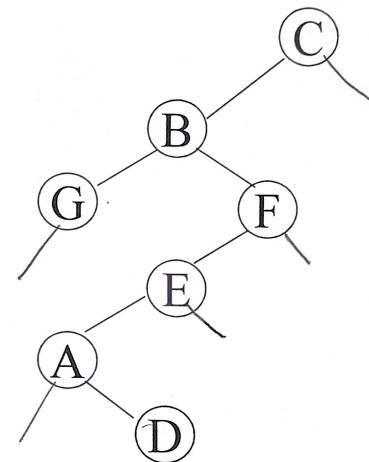


What are the children of *k* after deletion of *b* ?

Give both possible variants *x* or *m*.

What is the successor of *m* *A*.

G B A D E F C



What is the predecessor of B *G*.

What is the successor of F *C*.

What is the successor of E *E*.

What is the predecessor of G *C*. or null

10

7. Use dynamic programming find longest common subsequences of the following two sequences x and y: EBDA

Show all details, and circle the resulted subsequence letters.

	y	E	B	A	D	E	A
x	0	0	0	0	0	0	0
E	0	1	1	1	1	0	
B	0	1	2	2	2	2	2
B	0	1	2	2	2	2	2
D	0	1	2	2	3	3	3
A	0	1	2	3	3	3	4

EBDA

The diagram shows the step-by-step construction of the LCS. It starts with an empty sequence at the top left. The first character 'E' is added to the sequence because it appears in both strings. The next character 'B' is also added because it appears in both. The third character 'D' is added because it appears in both. The final character 'A' is added because it appears in both. The resulting sequence is 'EBDA'.