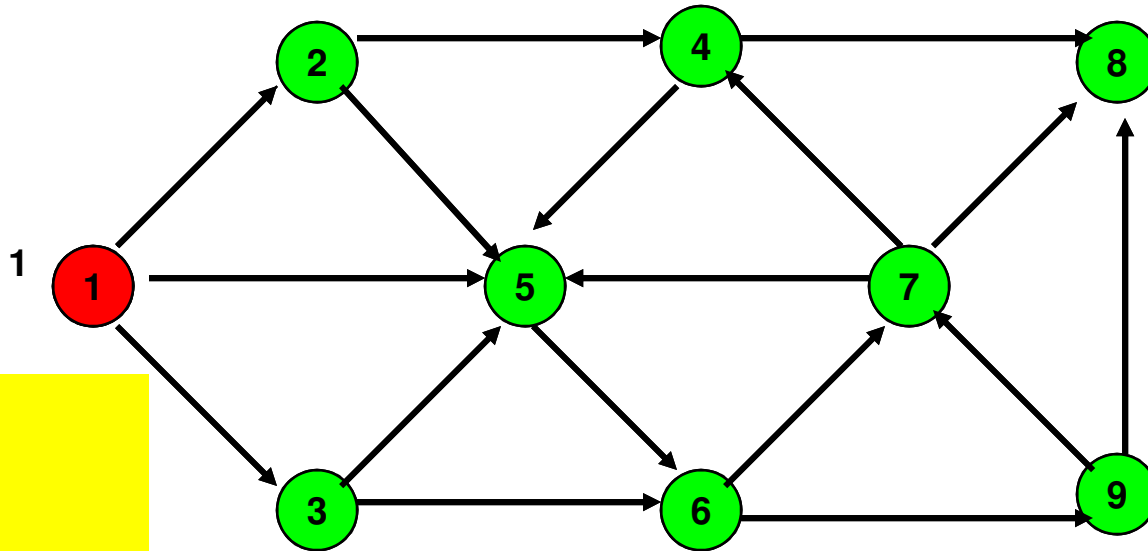**In the name of God**

Network Flows

2. Search Algorithms
2.2 Breadth-First Search –
An Example
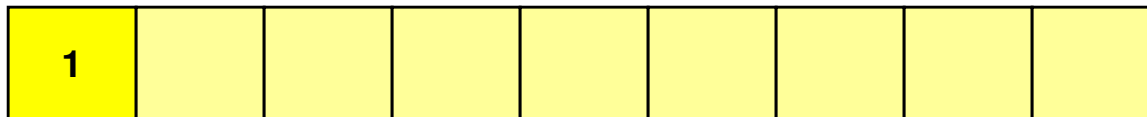
Fall 2010

Instructor: Dr. Masoud Yaghini

Initialize

pred(1) = 0
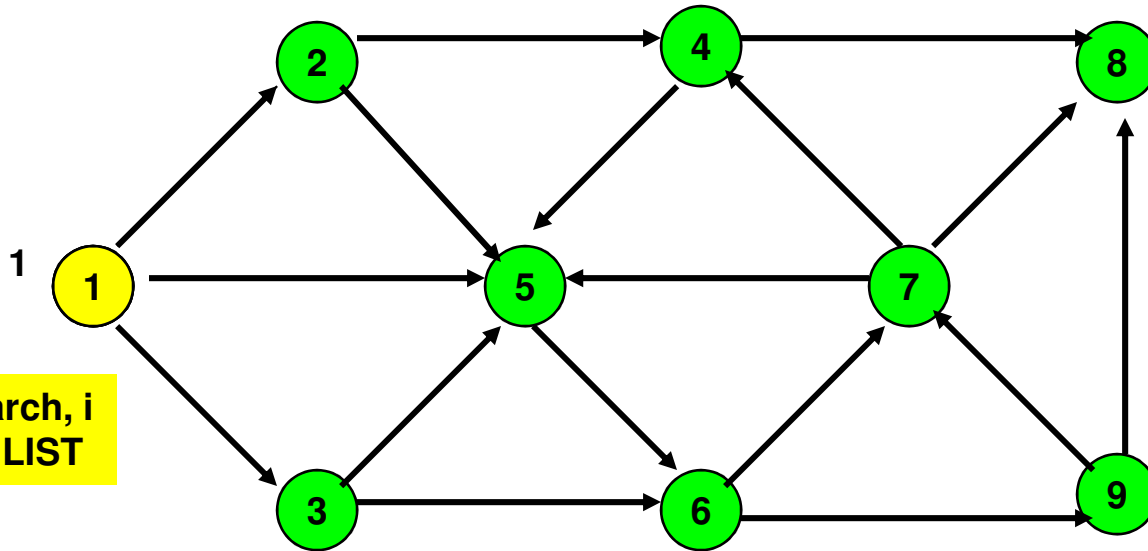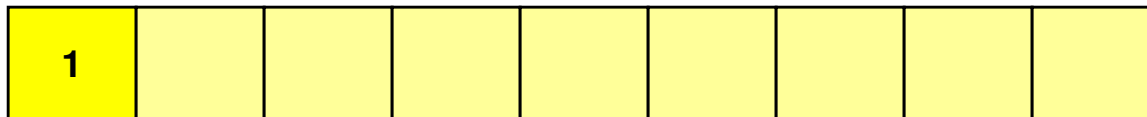
next := 1
order(next) = 1

LIST:= {1}

LIST

1								

next   1

Breadth first search animation

Select a node i in LIST

1

In breadth first search, i is the first node in LIST

LIST

1								

next   1

Breadth first search animation

If node i is incident to an admissible arc...

Next :=
   Next + 1

order(j) := next

add j to LIST

LIST

1	2							

next | 2 |

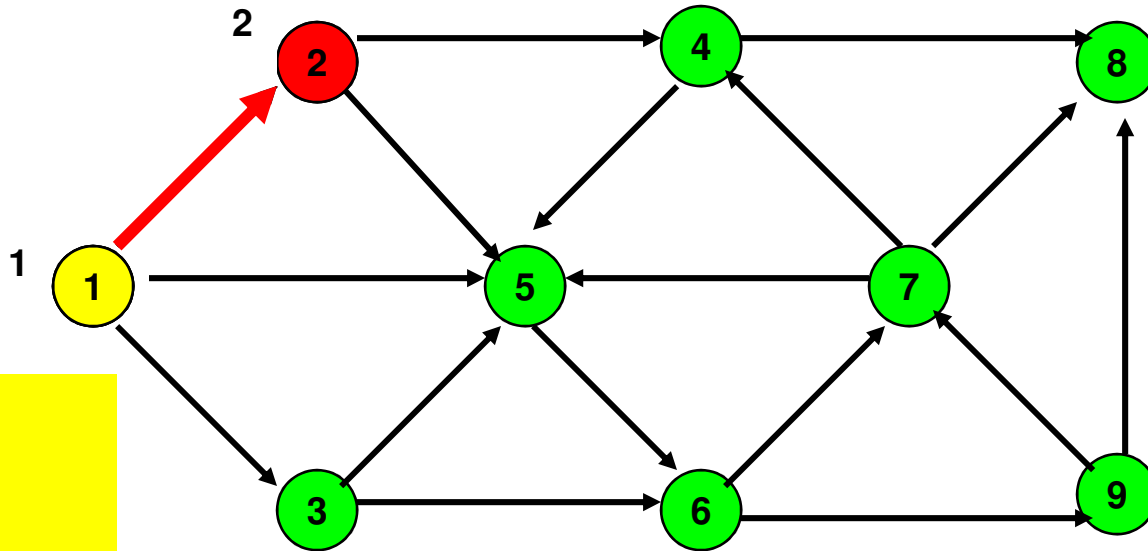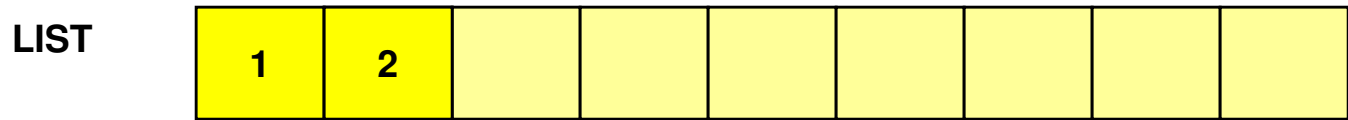**Breadth first search animation**

If node i is incident to an admissible arc...
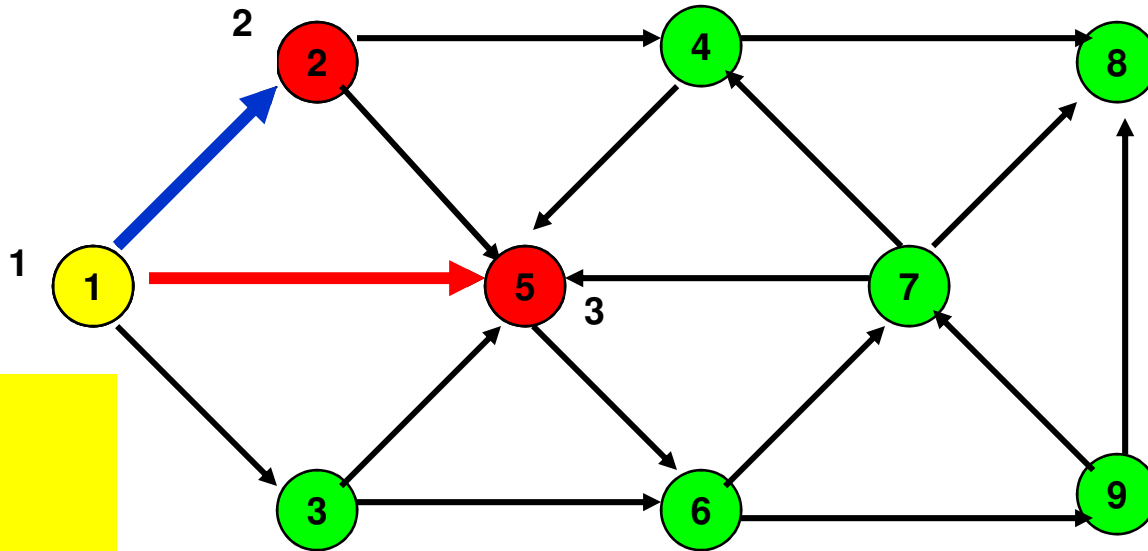
Next :=
   Next + 1

order(j) := next

add j to LIST

LIST

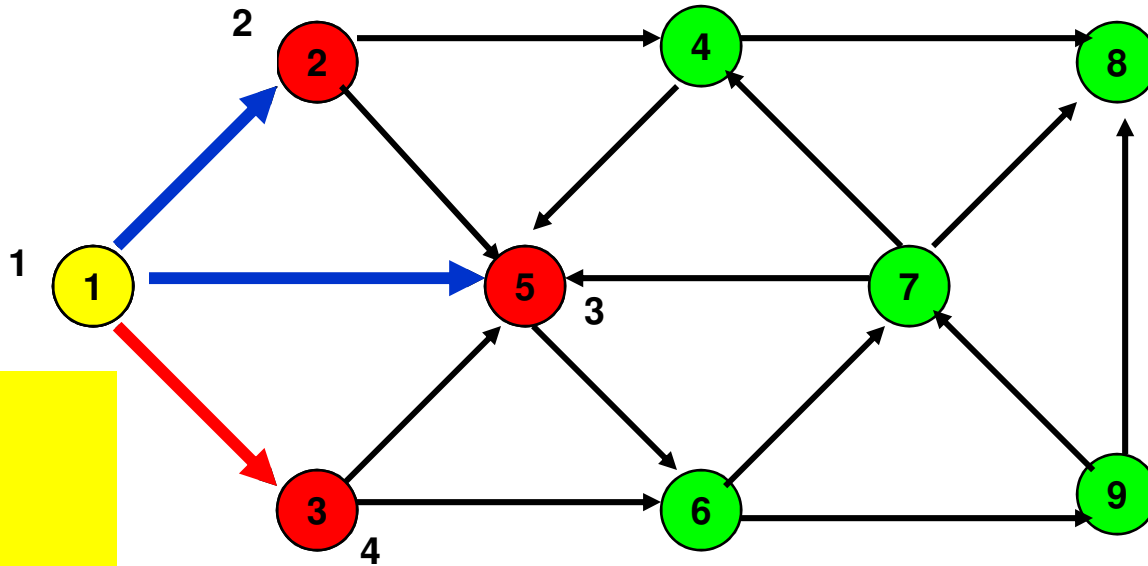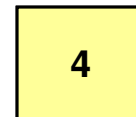| 1	2	5						

next   3

Breadth first search animation

If node i is incident to an admissible arc...

Next :=
   Next + 1

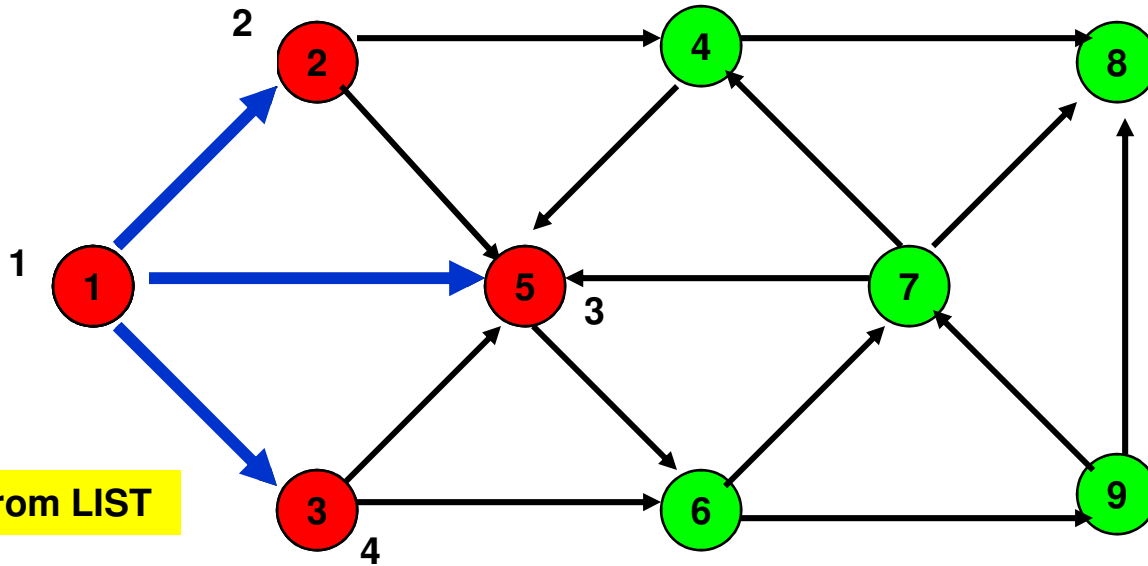order(j) := next

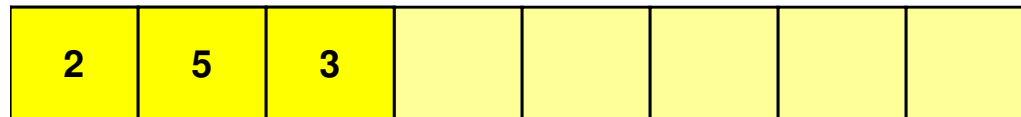add j to LIST

LIST

1	2	5	3					

next

4

Breadth first search animation

If node i is not incident to an admissible arc...

2

2

1

1

4

8

5

3

7

Delete node i from LIST

3

6

9

4

LIST

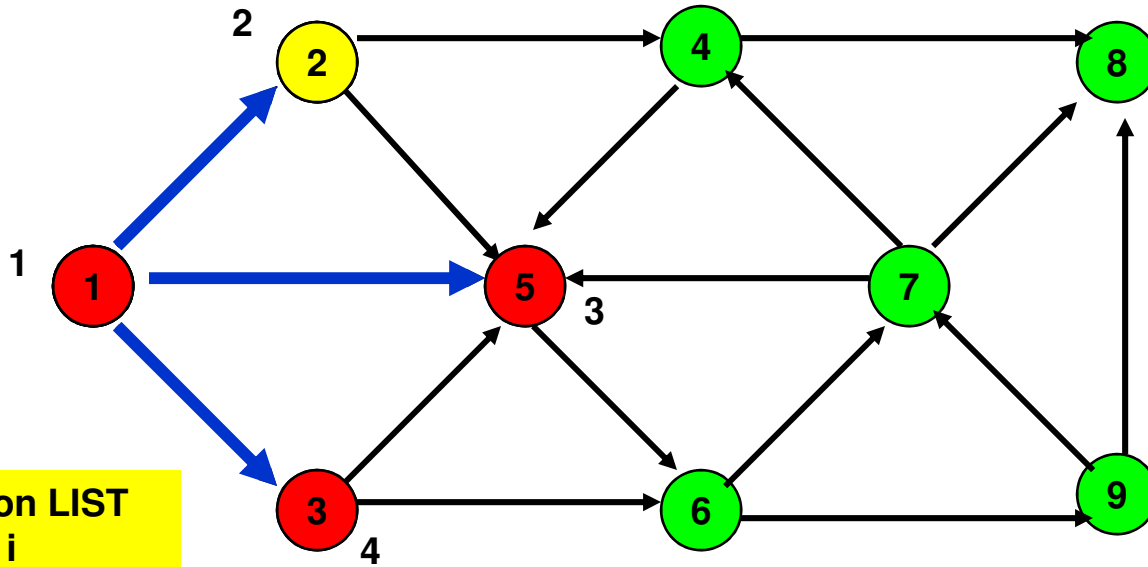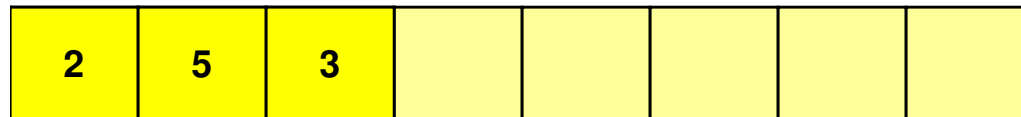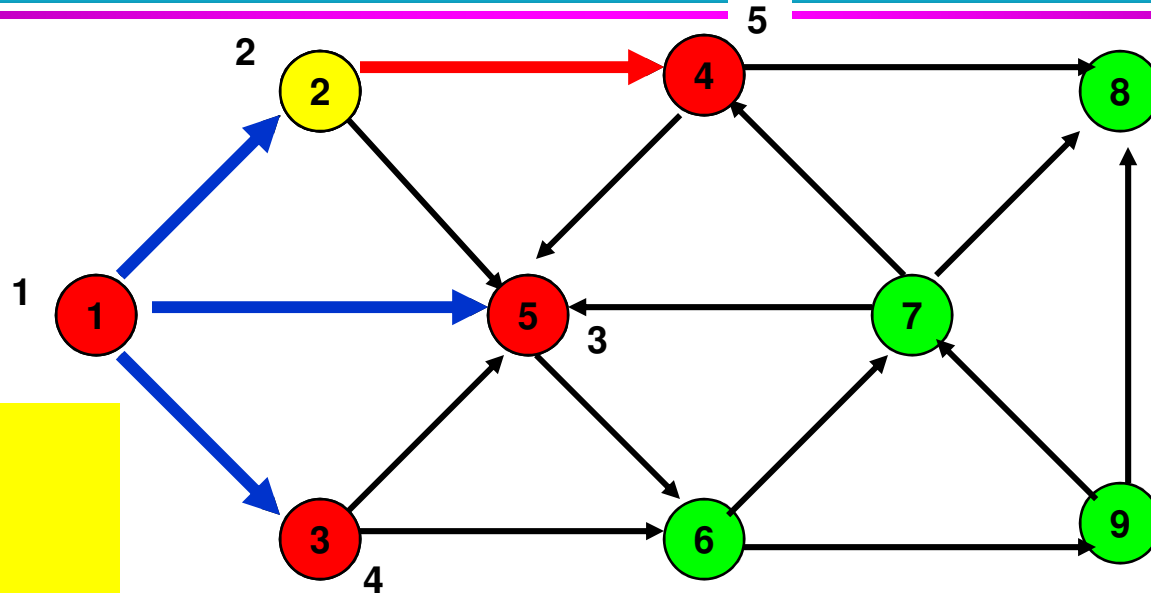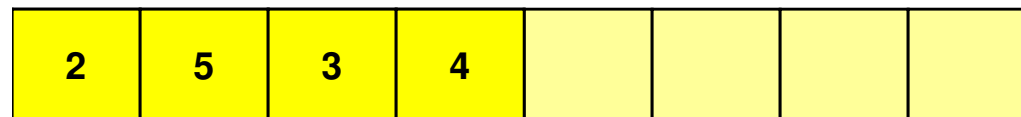| 2	5	3					

next

4
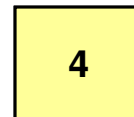
Breadth first search animation

Select Node i

The first node on LIST becomes node i
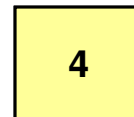
LIST

	2	5	3					

next 4

Breadth first search animation

If node i is incident to an admissible arc...

5

2
2

4

8

1
1

5

3

7

Next :=
   Next + 1

order(j) := next

add j to LIST

3

4

6

9

LIST

2	5	3	4				

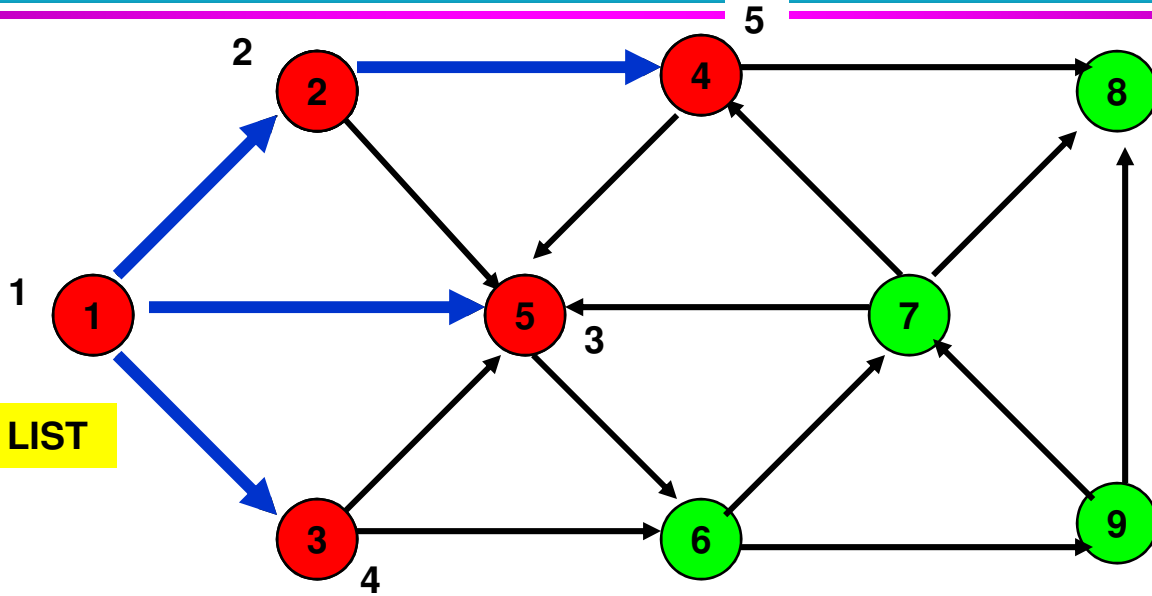next

5

Breadth first search animation

If node i is <u>not</u> incident to an admissible arc…

Delete node i from LIST

LIST

5	3	4				

next: 5

Breadth first search animation

Select a node

The first node on LIST becomes node i

LIST

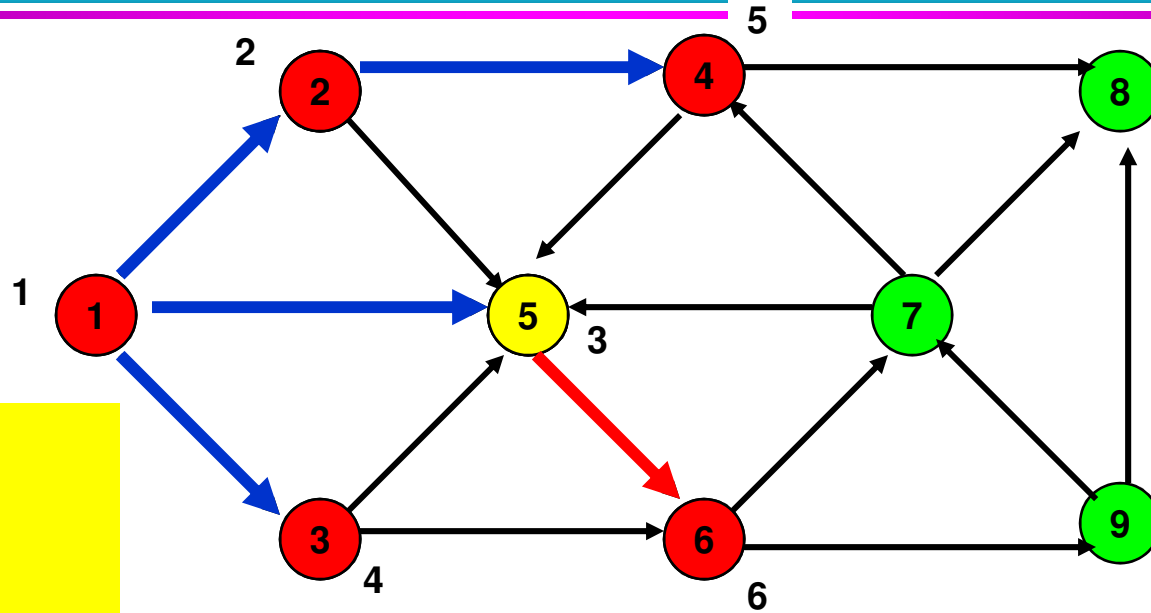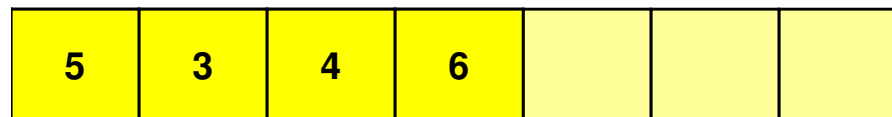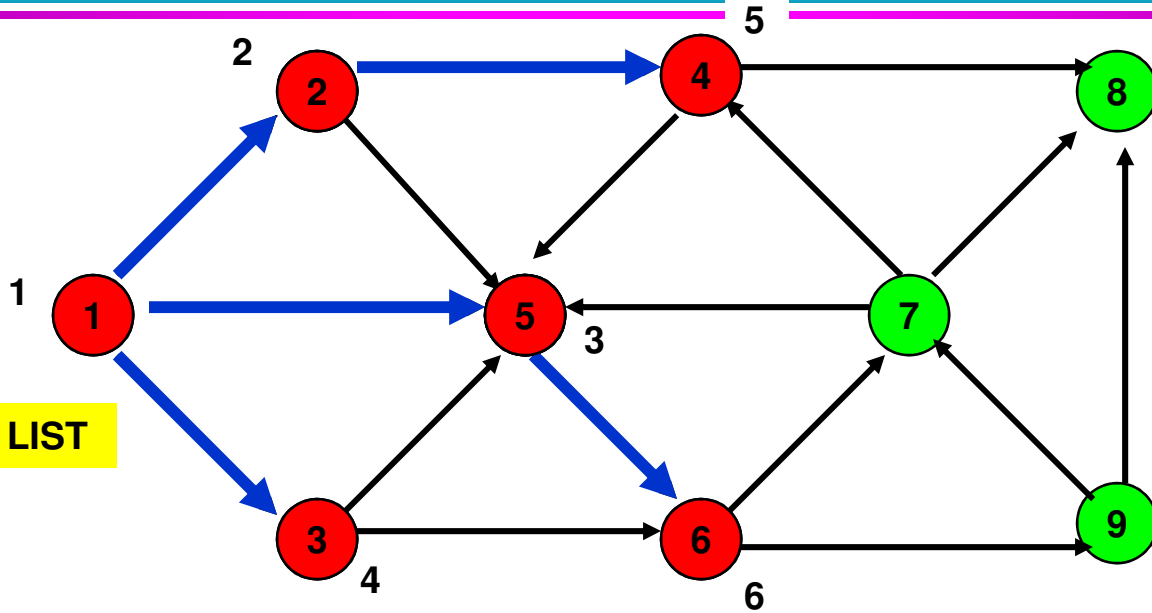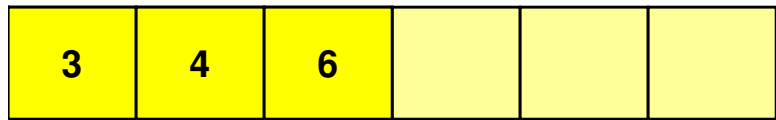| 5	3	4				

next `5`

Breadth first search animation

If node i is incident to an admissible arc…

5

2

Next :=
   Next + 1

order(j) := next

add j to LIST

1

2

3

4

6

LIST

5	3	4	6			

next

6

Breadth first search animation

If node i is <u>not</u> incident to an admissible arc…

2

5

1

3

4

6

Delete node i from LIST

LIST

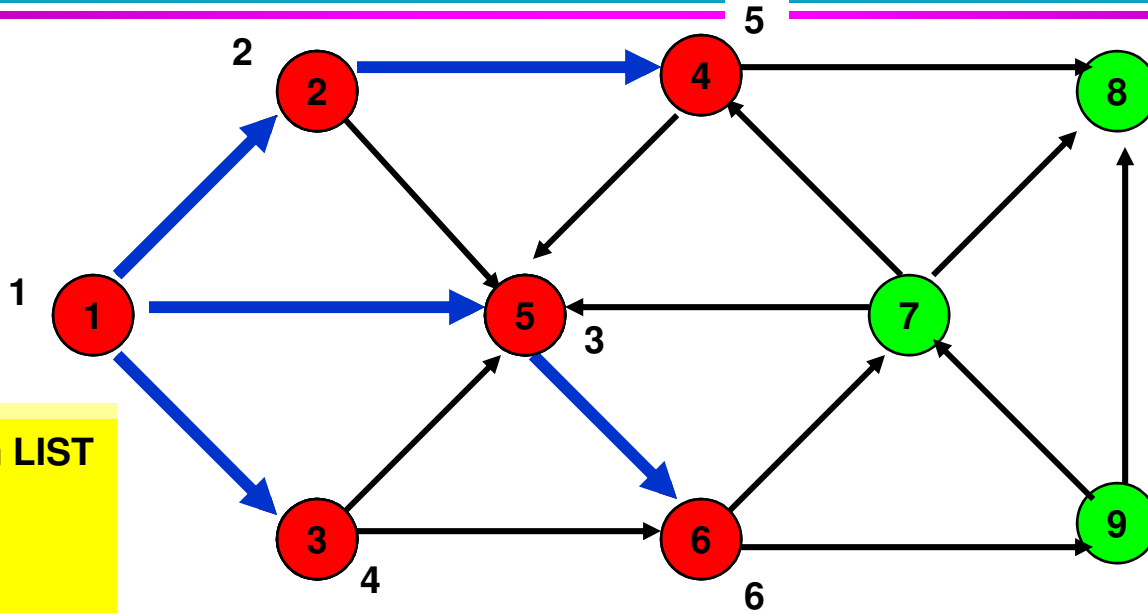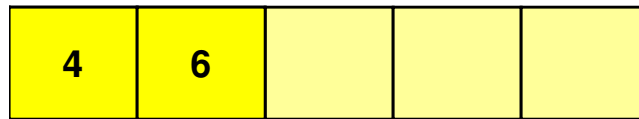| 3	4	6			

next

6
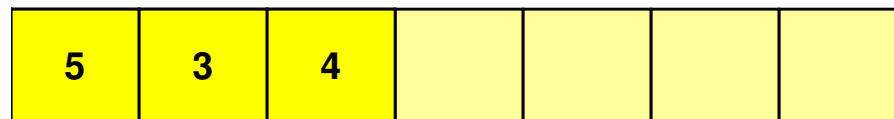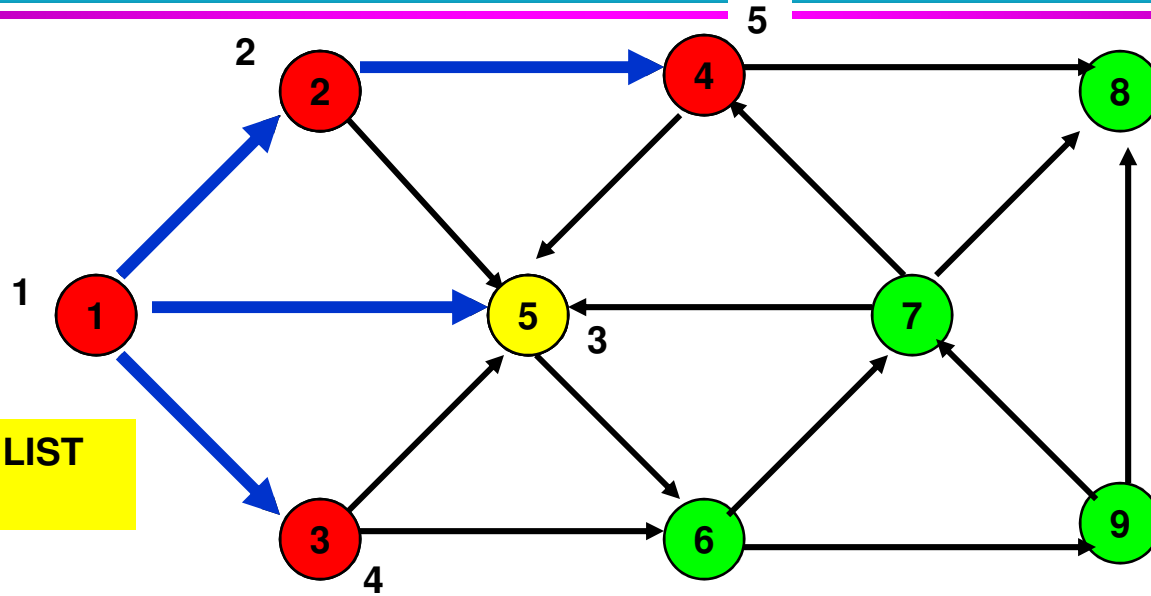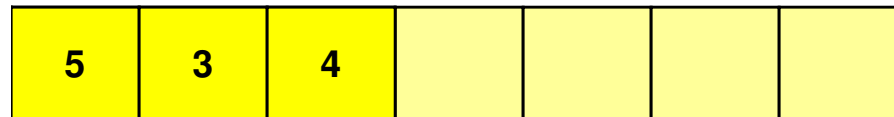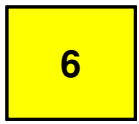
Breadth first search animation

Select node 3

delete node 3 from LIST

LIST

4	6			

next

6

Breadth first search animation

Select a node

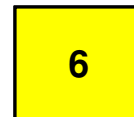i : = 4

LIST

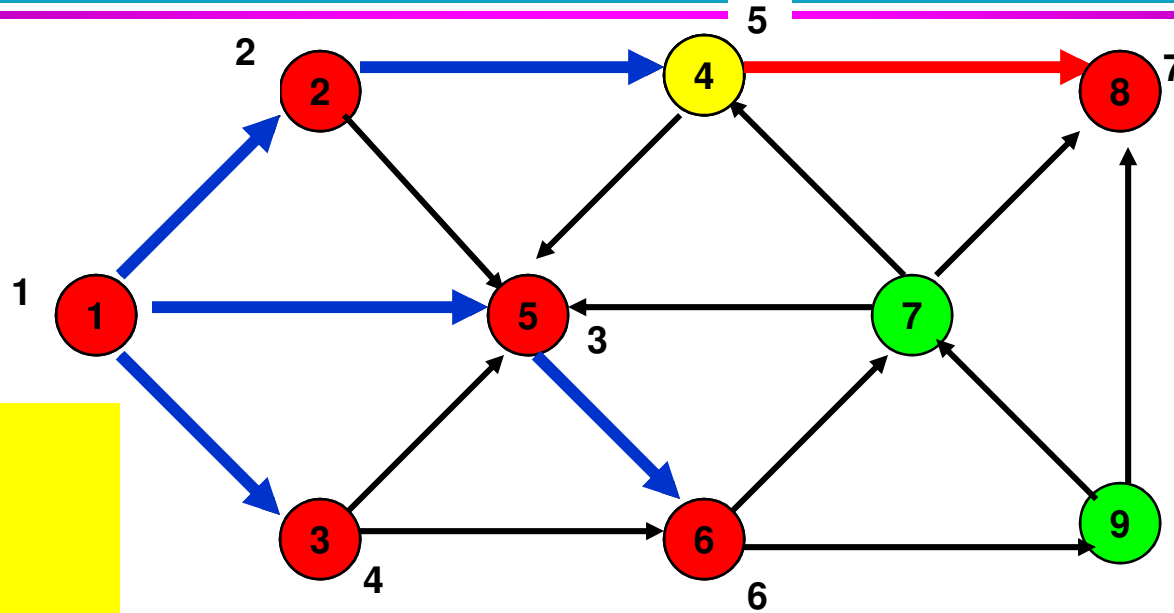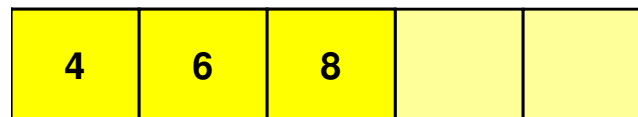| 4	6			

next

6

Breadth first search animation

If node i is incident to an admissible arc...

Next :=
   Next + 1

order(j) := next

add j to LIST

LIST

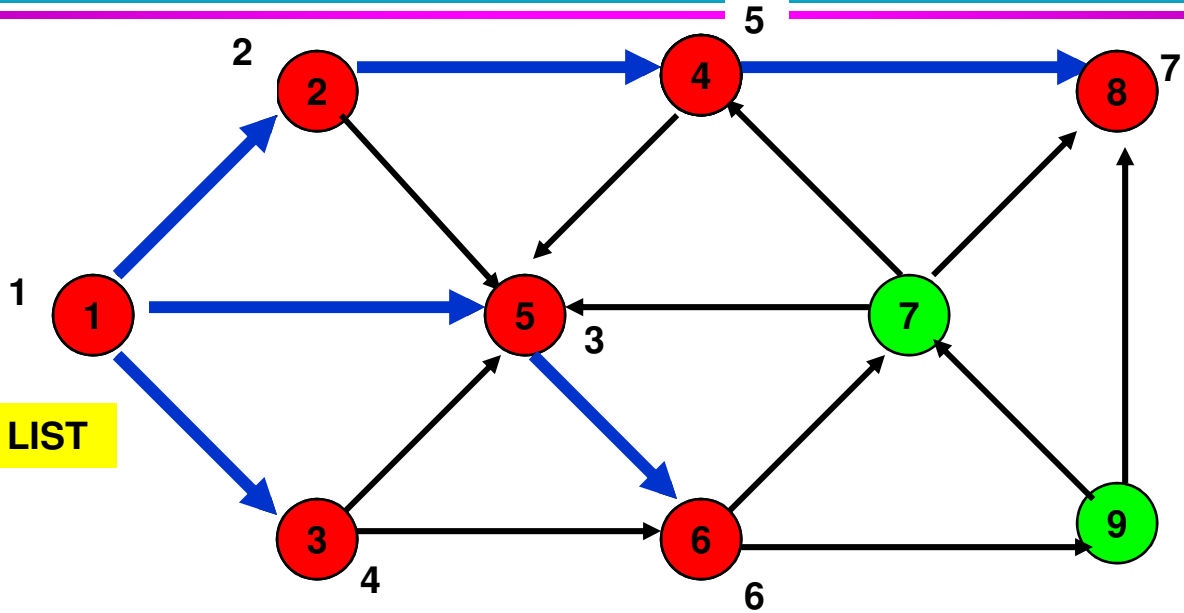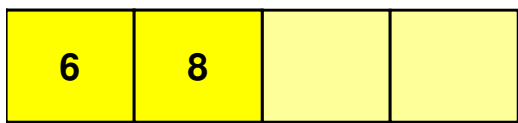| 4	6	8		

next

7

Breadth first search animation

If node i is <u>not</u> incident to an admissible arc...

Delete node i from LIST

LIST

6	8		

next

7

Breadth first search animation

Select node i

i := 6

LIST

6	8		

next

7

Breadth first search animation

If node i is incident to an admissible arc...

5

2   2   4   8   7
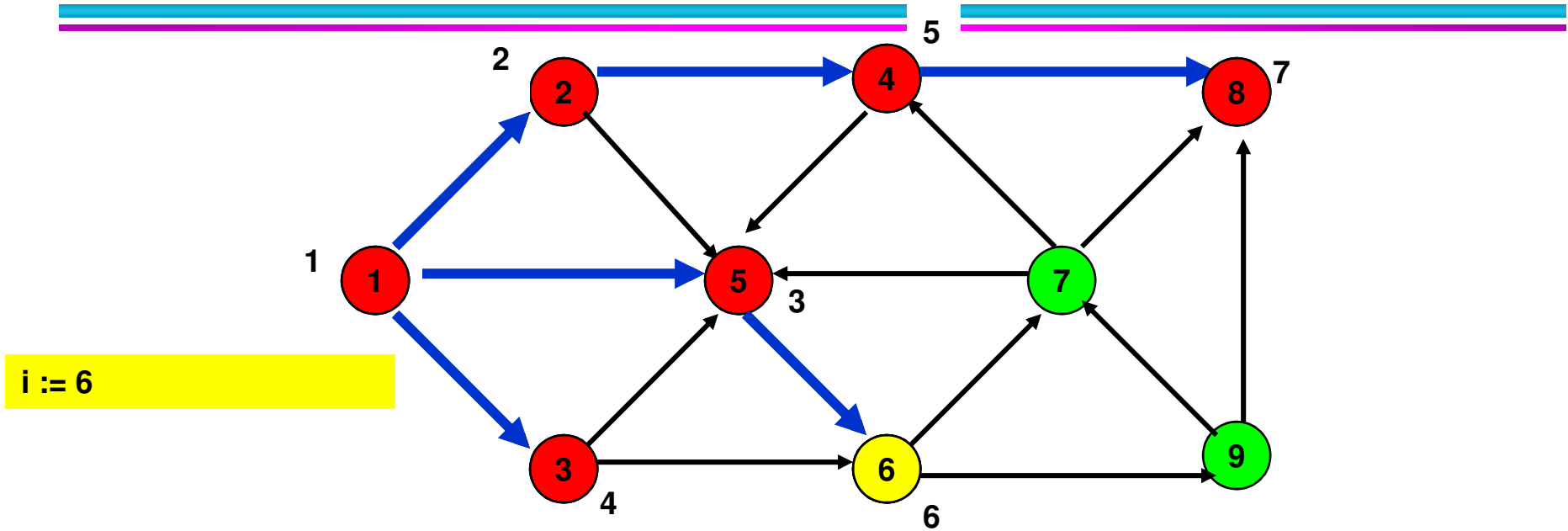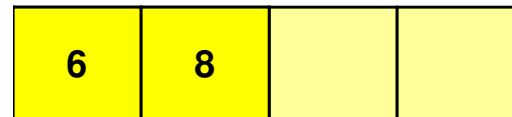
1   1   5   7   8
         3

Next :=
   Next + 1

order(j) := next

add j to LIST

3   6   9
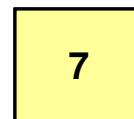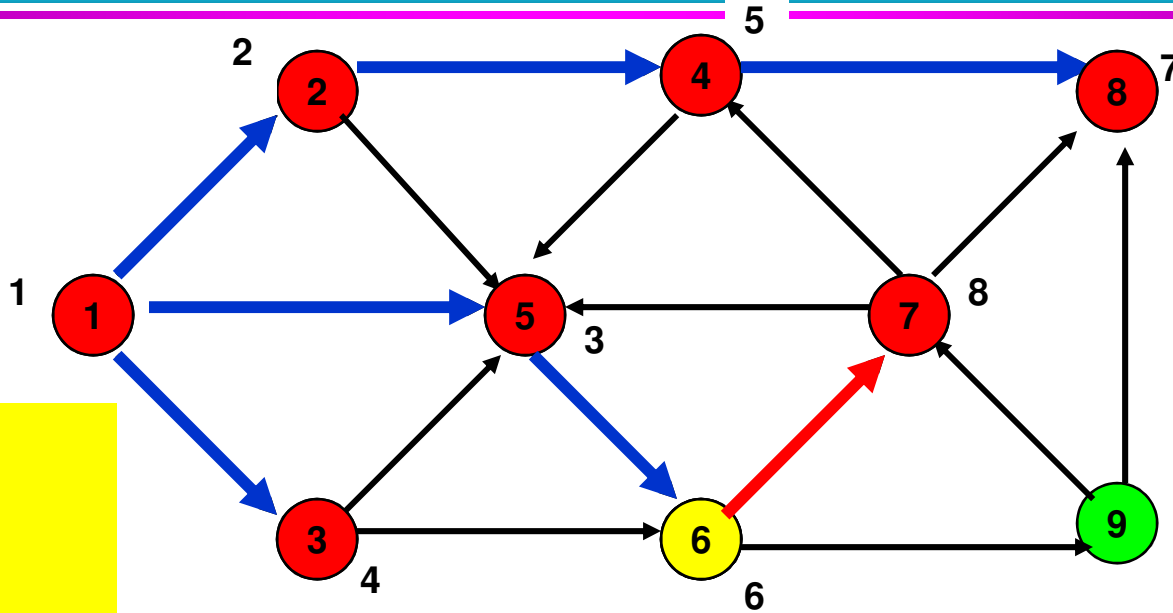4   6
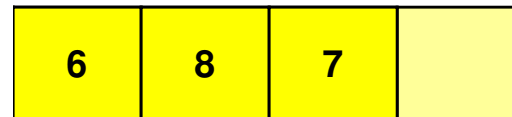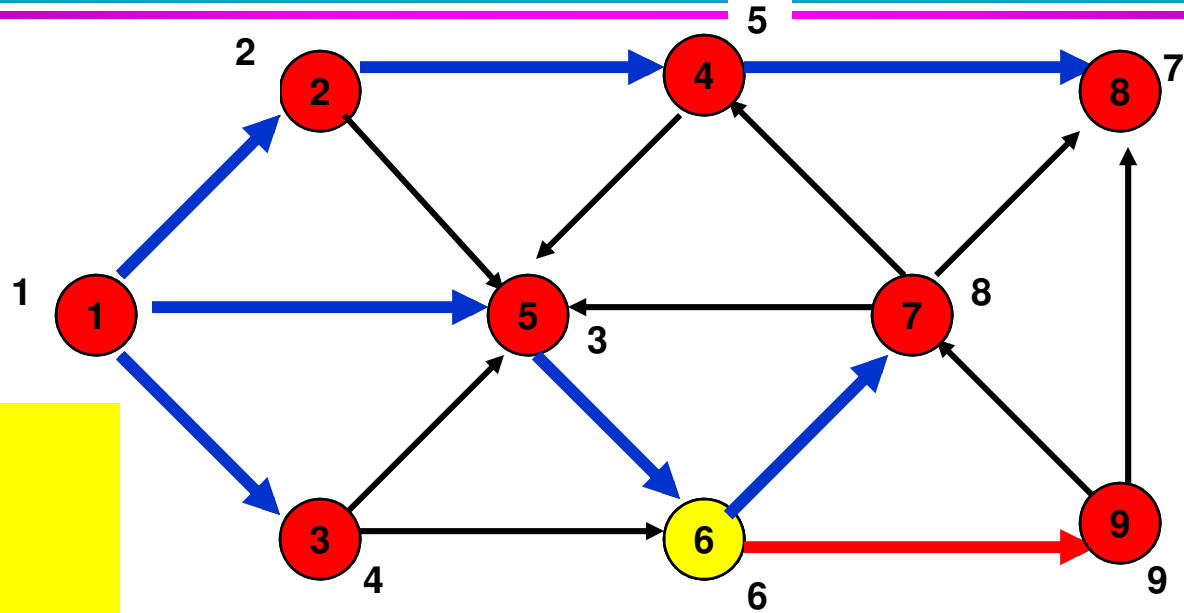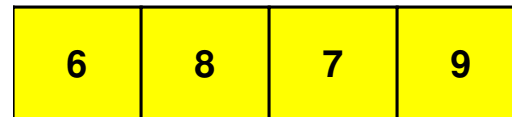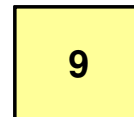
LIST

| 6 | 8 | 7 | |

next | 8 |

Breadth first search animation

If node i is incident to an admissible arc...

Next :=
   Next + 1

order(j) := next

add j to LIST

LIST

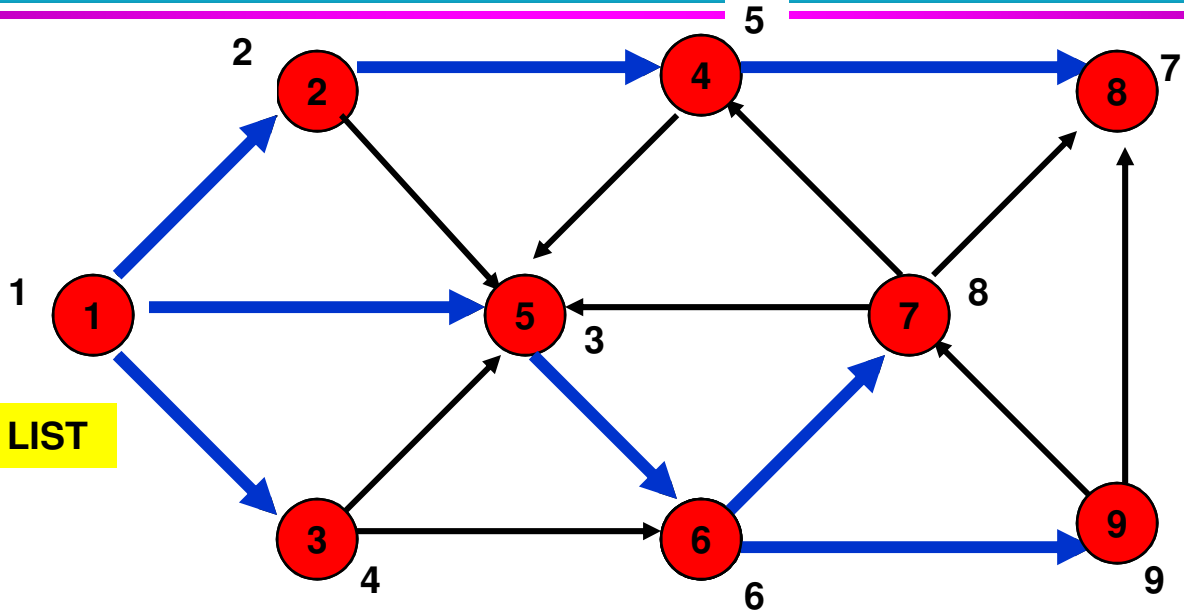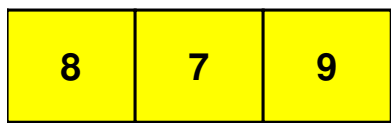| 6	8	7	9

next

9

Breadth first search animation

If node i is <u>not</u> incident to an admissible arc...

Delete node i from LIST

LIST

8	7	9

next

9

Breadth first search animation

Select node 8

node 8 is not incident to an admissible arc; delete it from LIST

LIST

7	9

next

9

Breadth first search animation

Select node 7
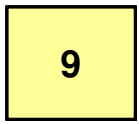
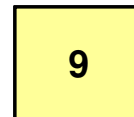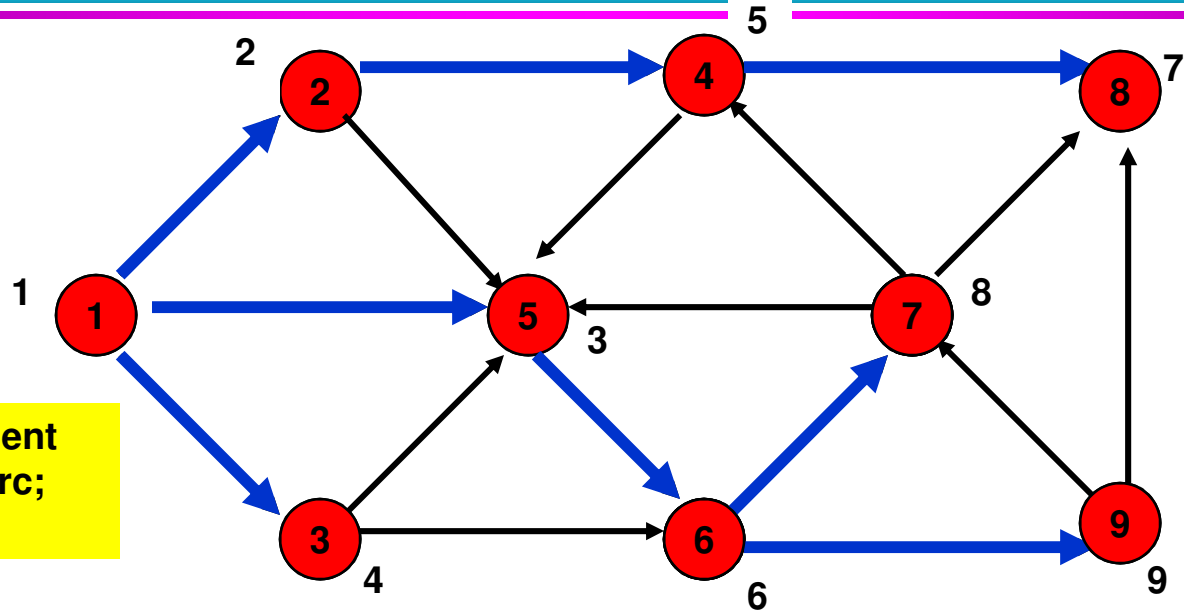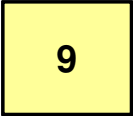node 7 is not incident
to an admissible arc;
delete it from LIST

LIST

9

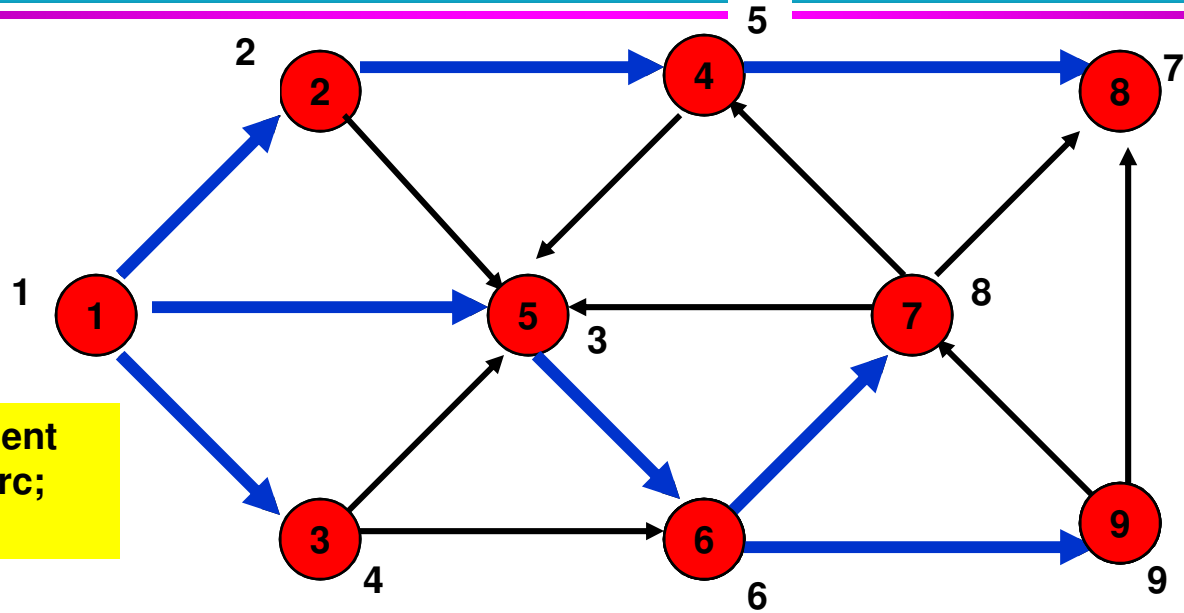next   9

Breadth first search animation

Select node 9

node 9 is not incident to an admissible arc; delete it from LIST

LIST

next   9

Breadth first search animation

The End