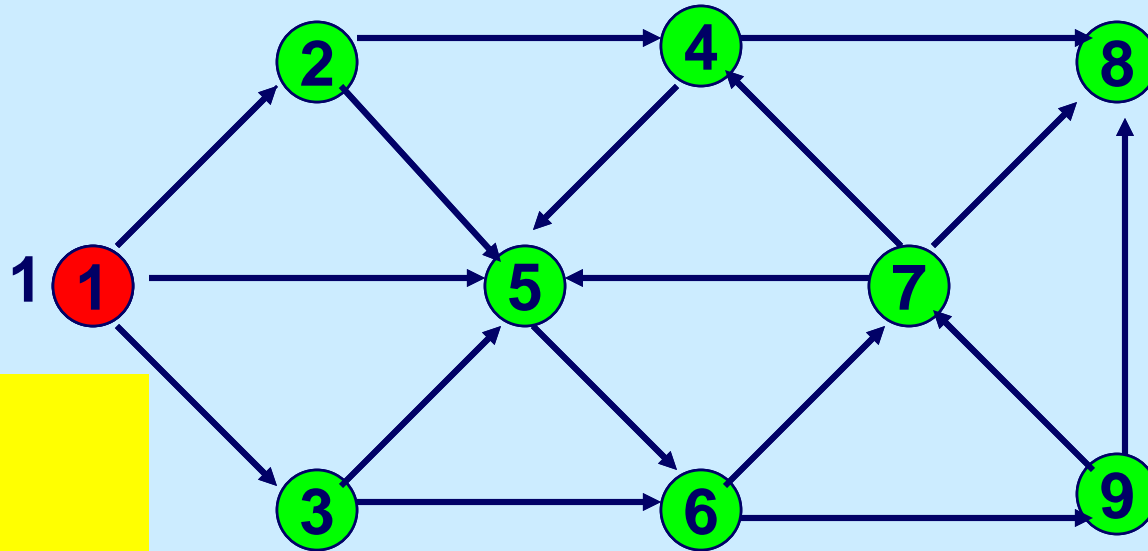

15.082 and 6.855J

Depth First Search

Initialize



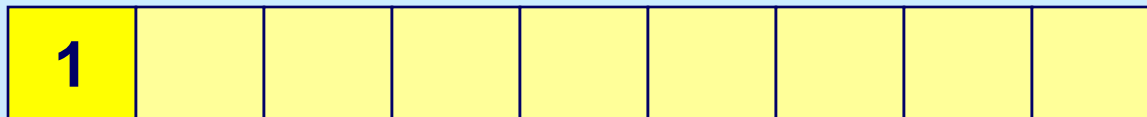
$\text{pred}(1) = 0$

$\text{next} := 1$

$\text{order}(\text{next}) = 1$

$\text{LIST} := \{1\}$

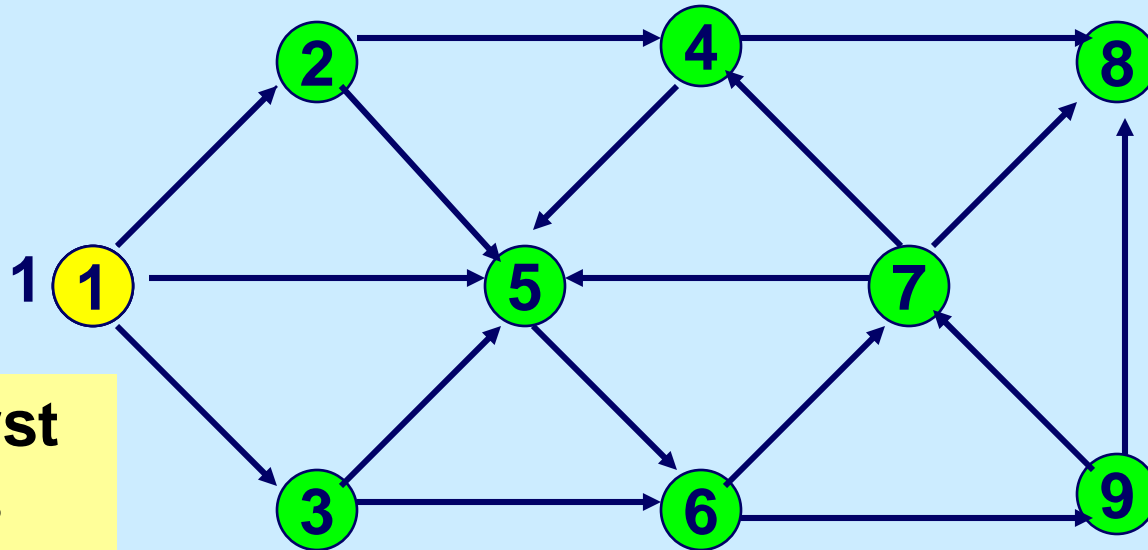
LIST



next

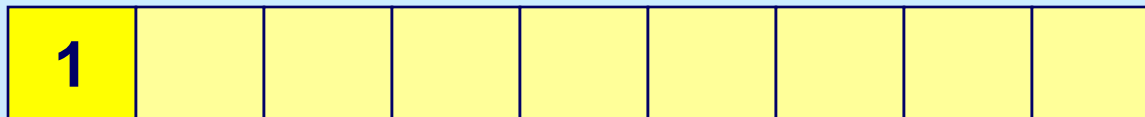
1

Select a node i in LIST



In depth first search, i is the last node in LIST

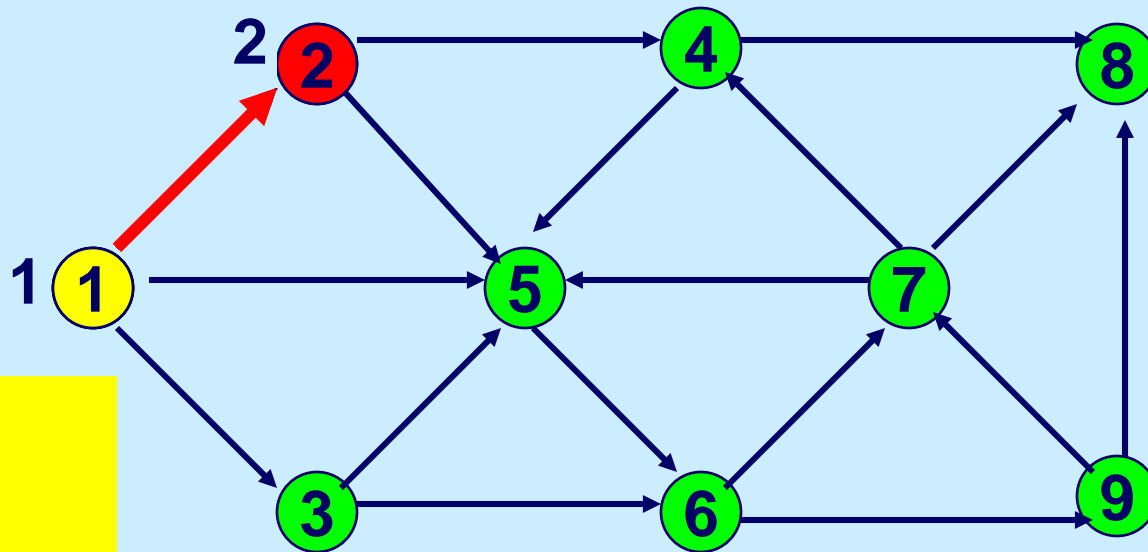
LIST



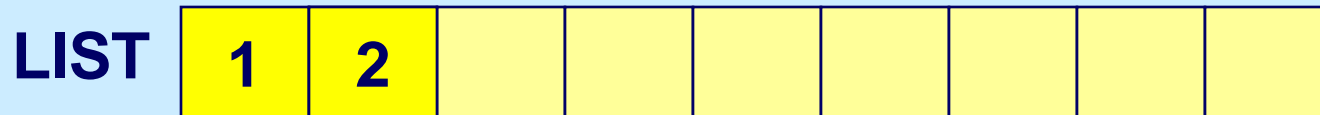
next

1

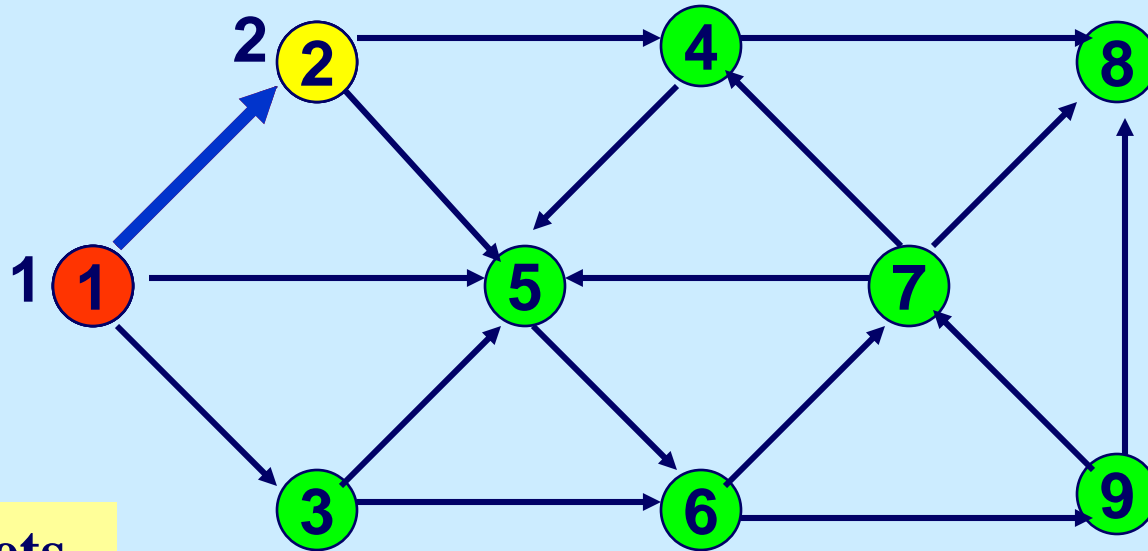
If node i is incident to an admissible arc...



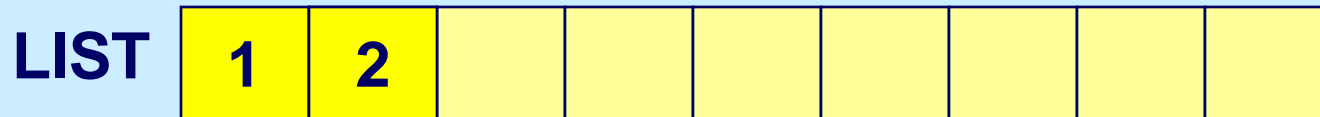
Next :=
Next + 1
order(j) := next
add j to LIST



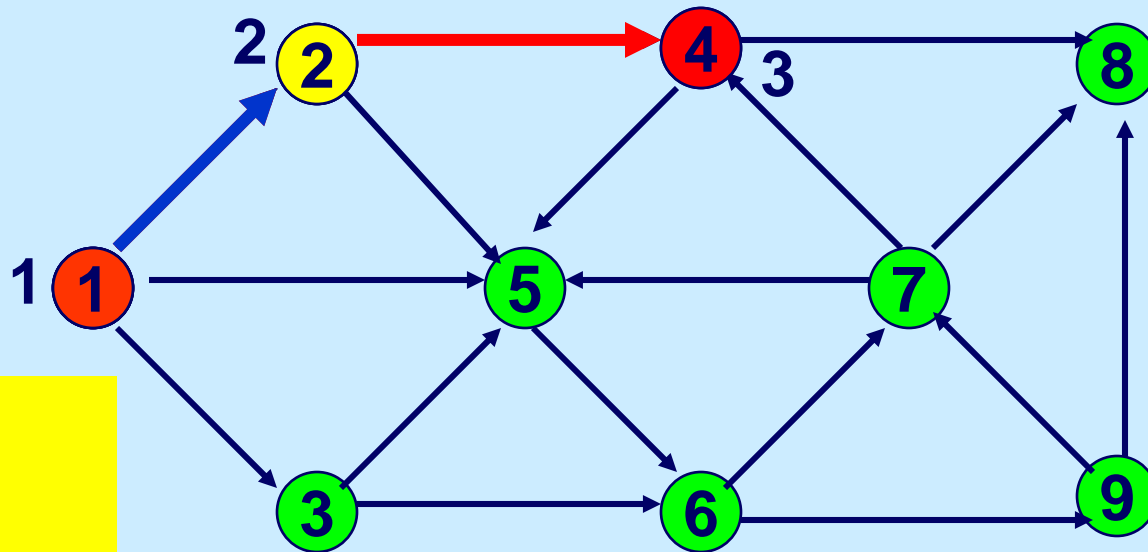
Select the last node on LIST



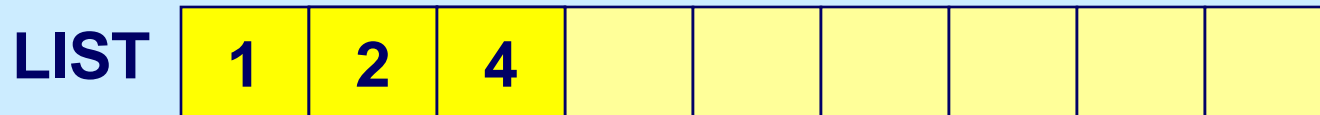
Node 2 gets selected



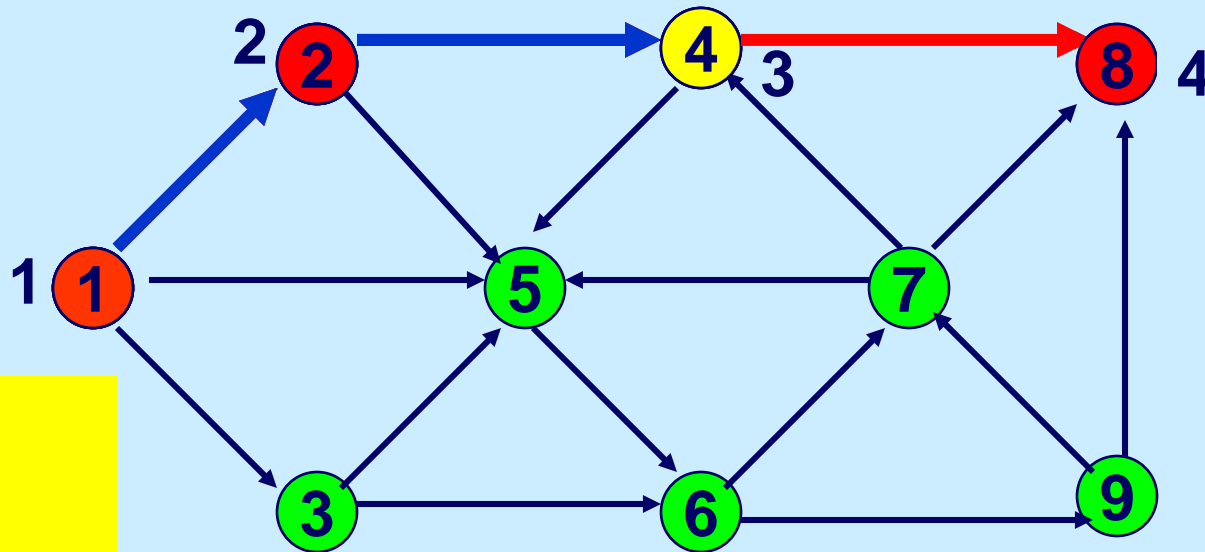
If node i is incident to an admissible arc...



Next :=
Next + 1
order(j) := next
add j to LIST



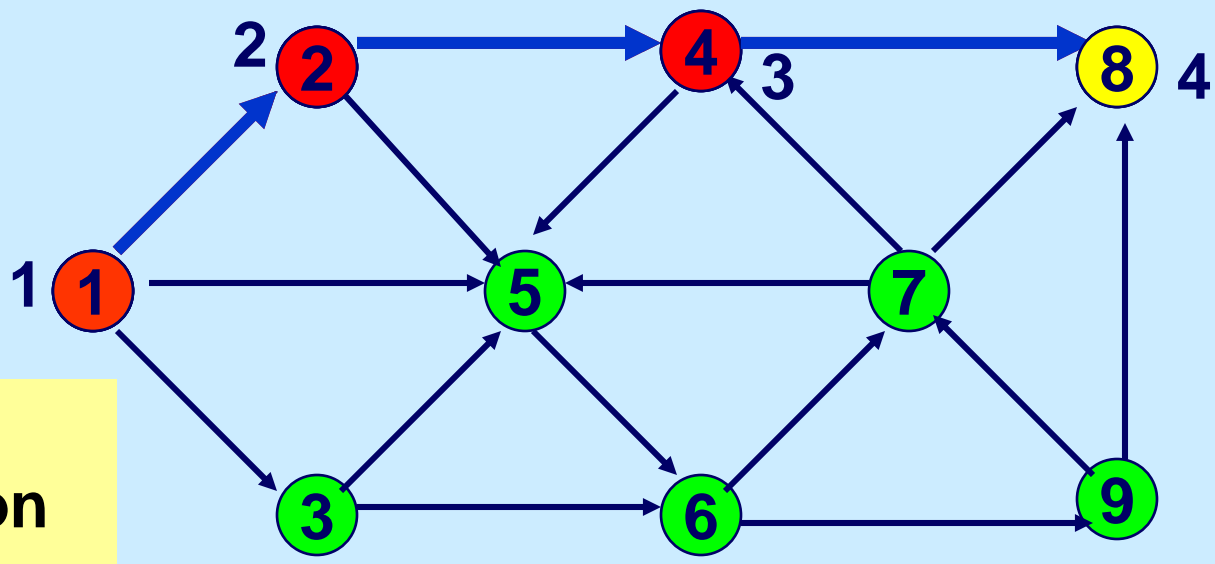
If node i is incident to an admissible arc...



Next :=
Next + 1
order(j) := next
add j to LIST



Select



Select the last node on LIST

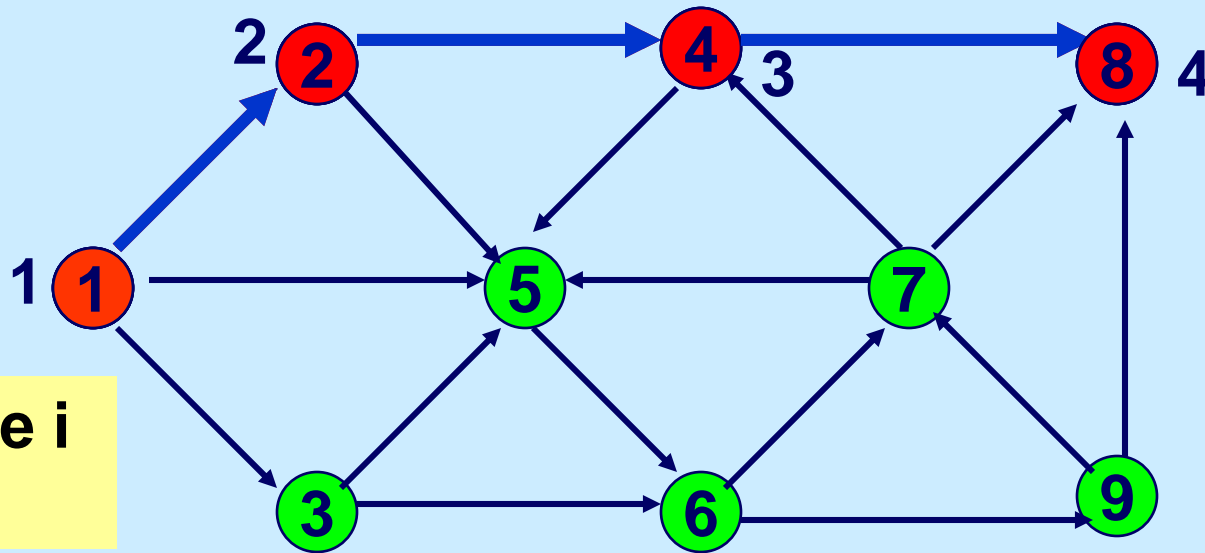
LIST

1	2	4	8					
---	---	---	---	--	--	--	--	--

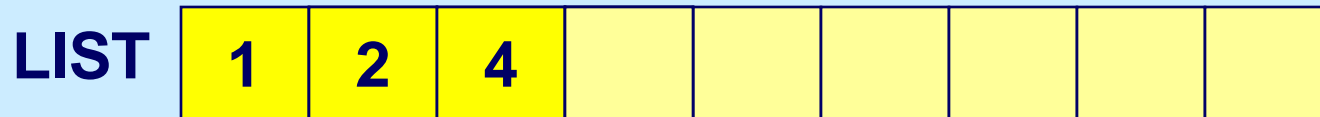
next

4

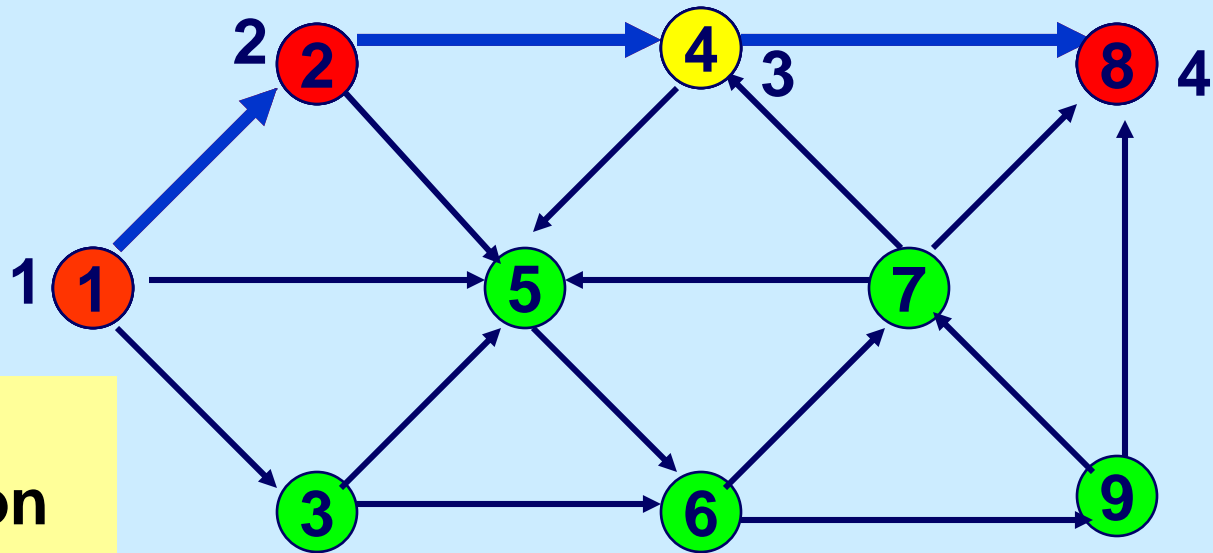
If node i is not incident to an admissible arc...



Delete node i
from LIST

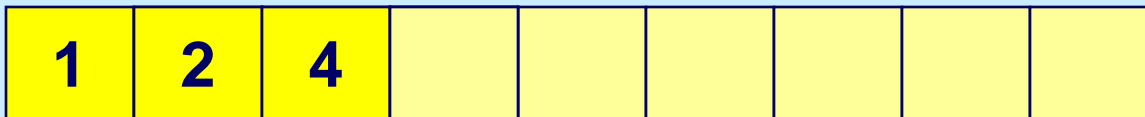


Select



Select the last node on LIST

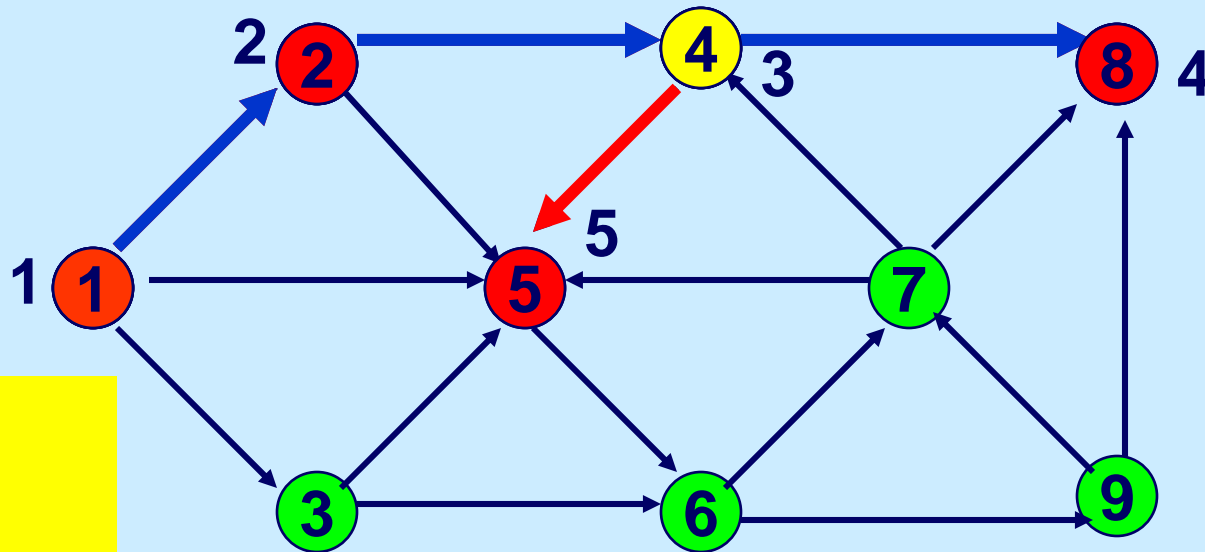
LIST



next

4

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

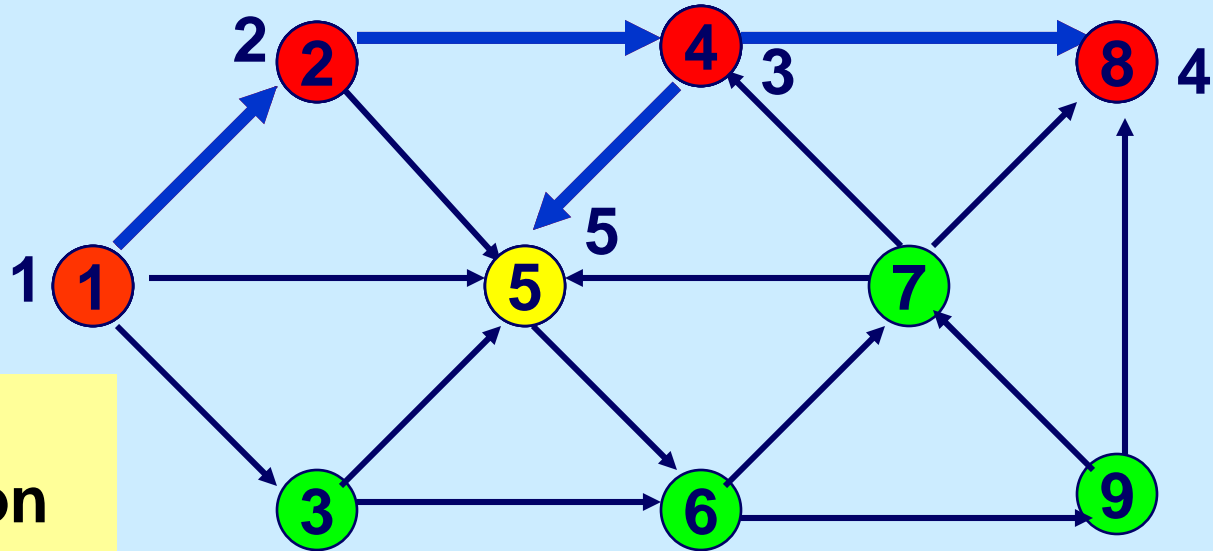


Next :=
Next + 1
order(j) := next
add j to LIST



next 5

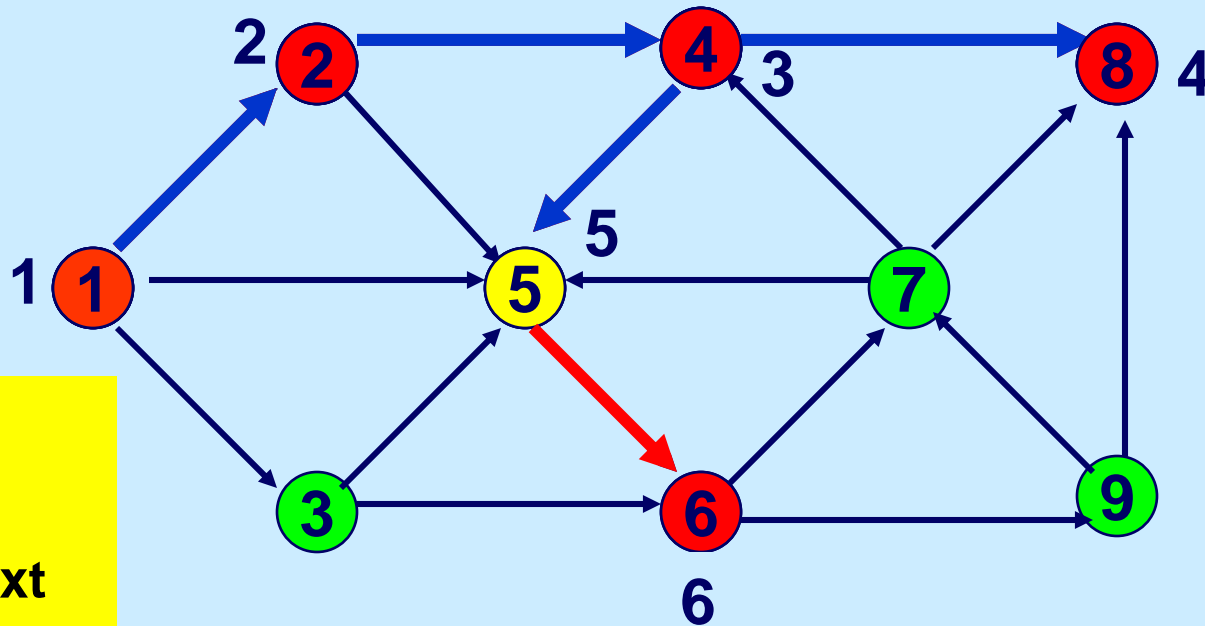
Select



Select the last node on LIST



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



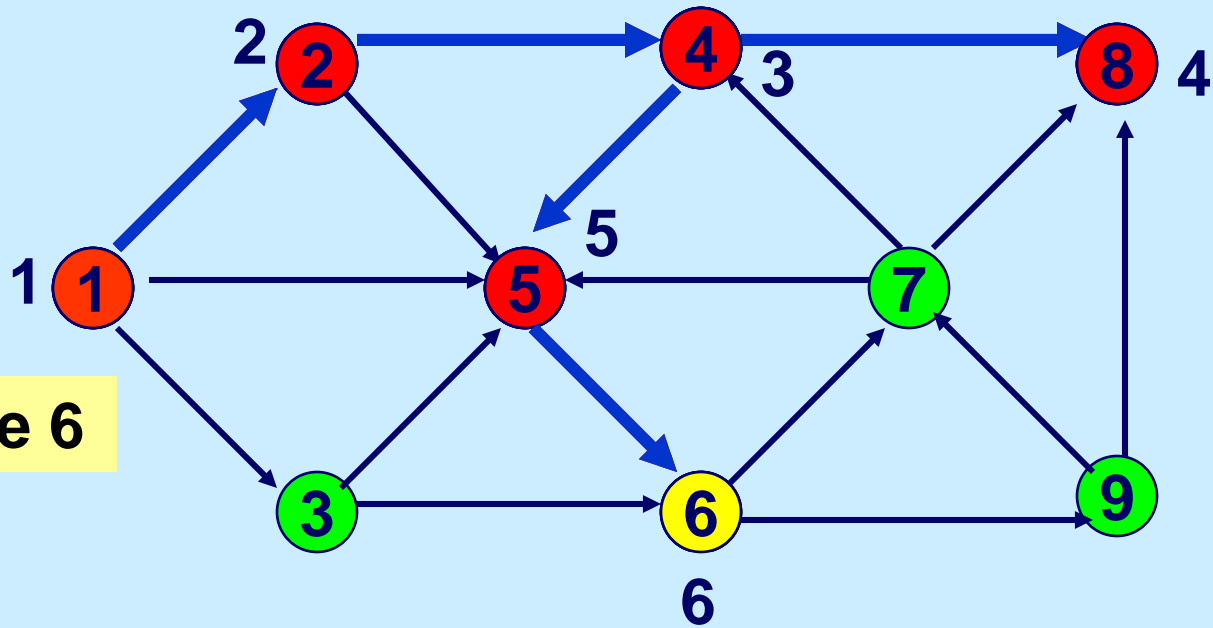
Next :=
Next + 1
order(j) := next
add j to LIST

LIST

1	2	4	5	6				
---	---	---	---	---	--	--	--	--

next 6

Select the last node on LIST



Select node 6

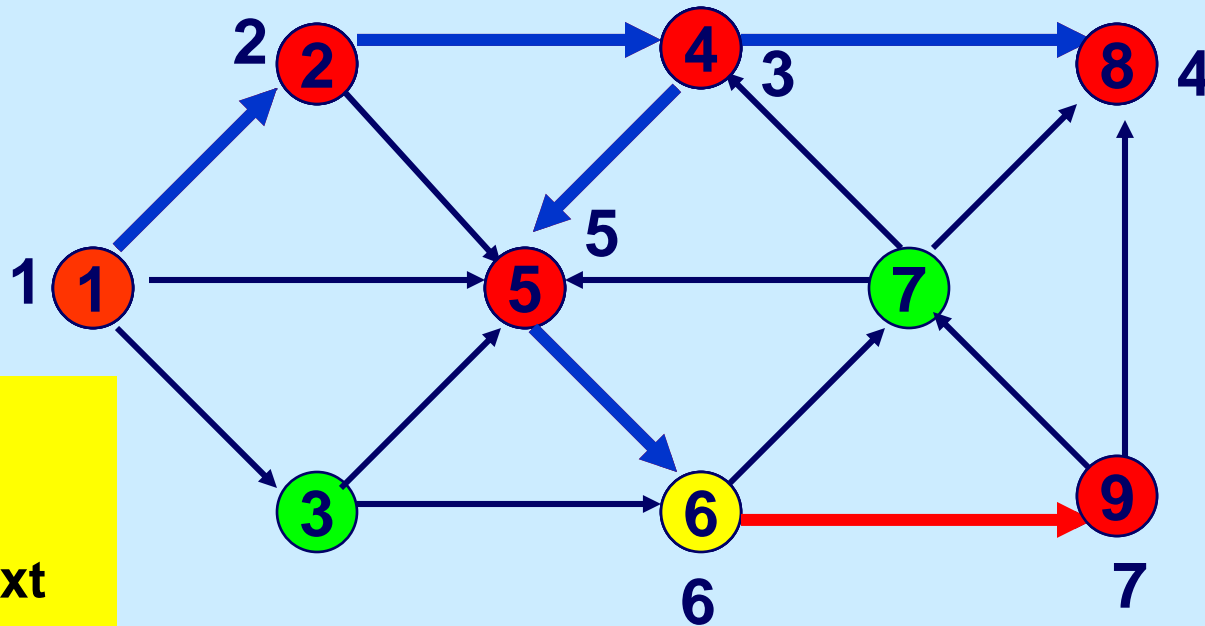
LIST

1	2	4	5	6				
---	---	---	---	---	--	--	--	--

next

6

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

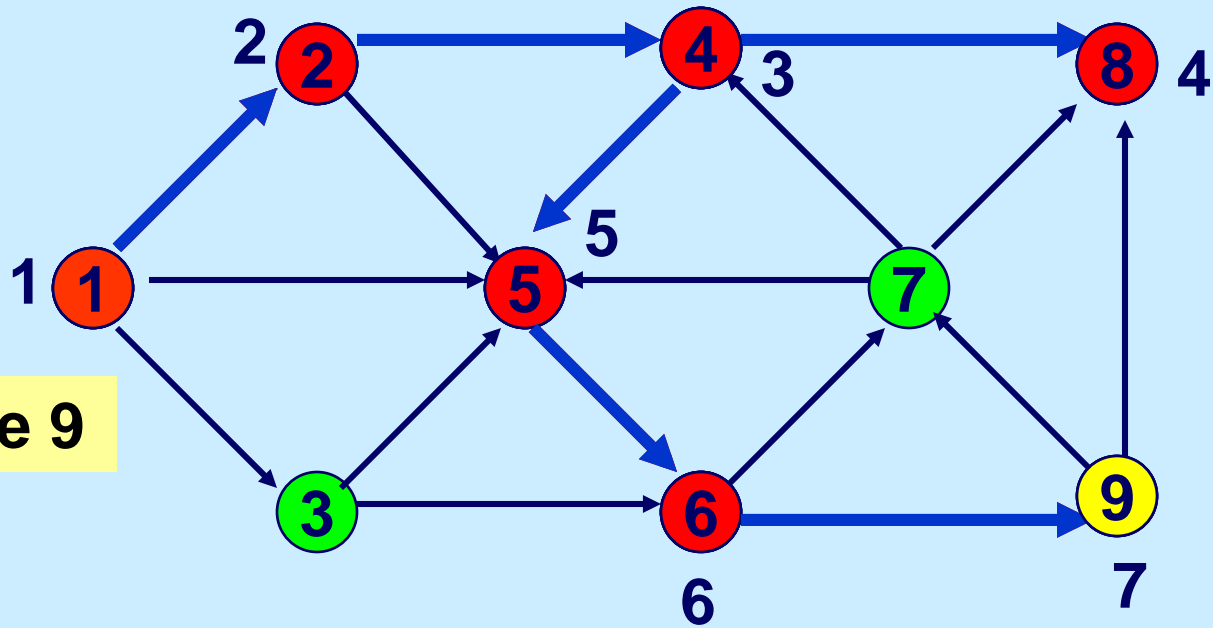


Next :=
Next + 1
order(j) := next
add j to LIST

LIST	1	2	4	5	6	9			
------	---	---	---	---	---	---	--	--	--

next 7

Select the last node on LIST



Select node 9

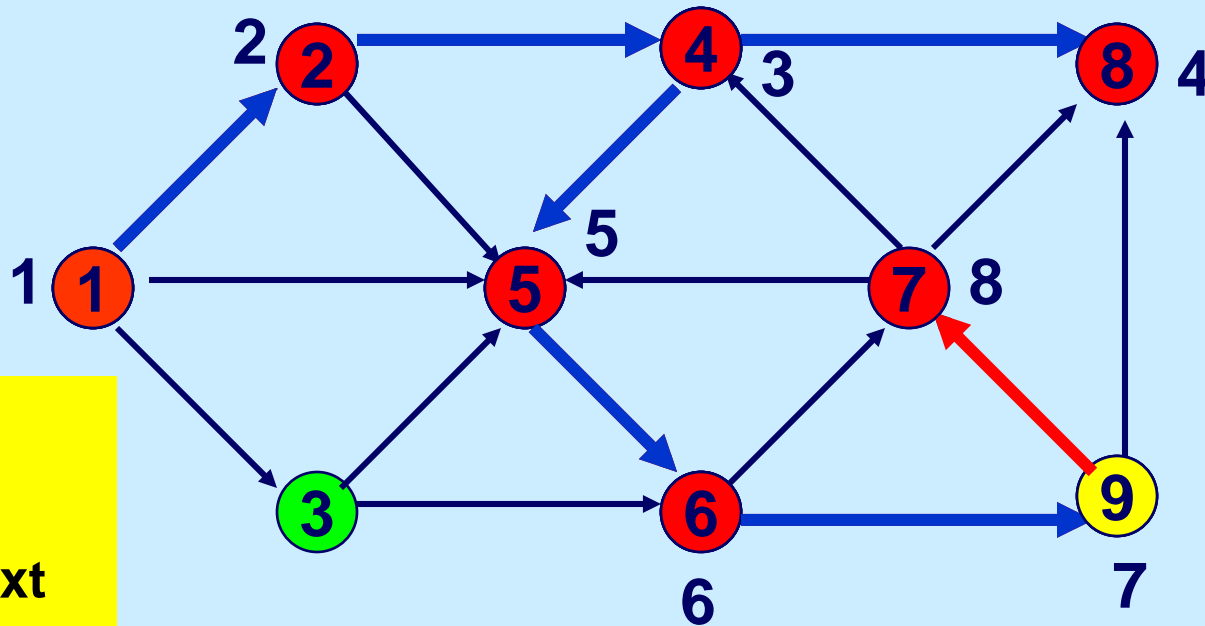
LIST

1	2	4	5	6	9			
---	---	---	---	---	---	--	--	--

next

7

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



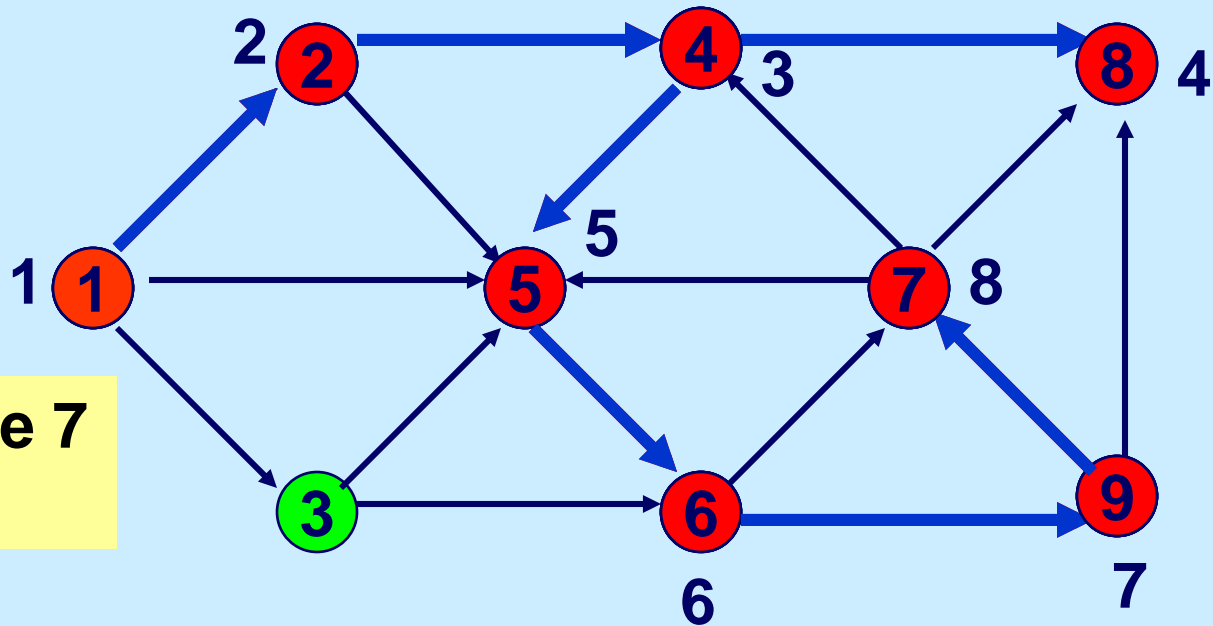
Next :=
Next + 1
order(j) := next
add j to LIST

LIST

1	2	4	5	6	9	7		
---	---	---	---	---	---	---	--	--

next 8

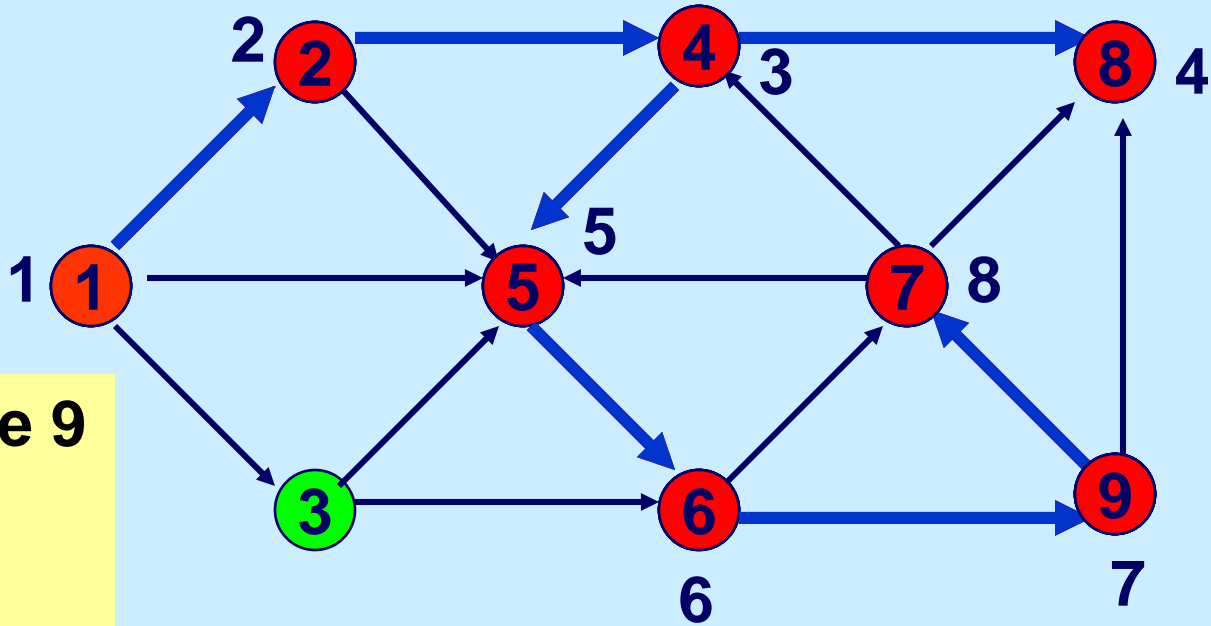
If node i is not incident to an admissible arc...



Delete node 7
from LIST



Select node 9



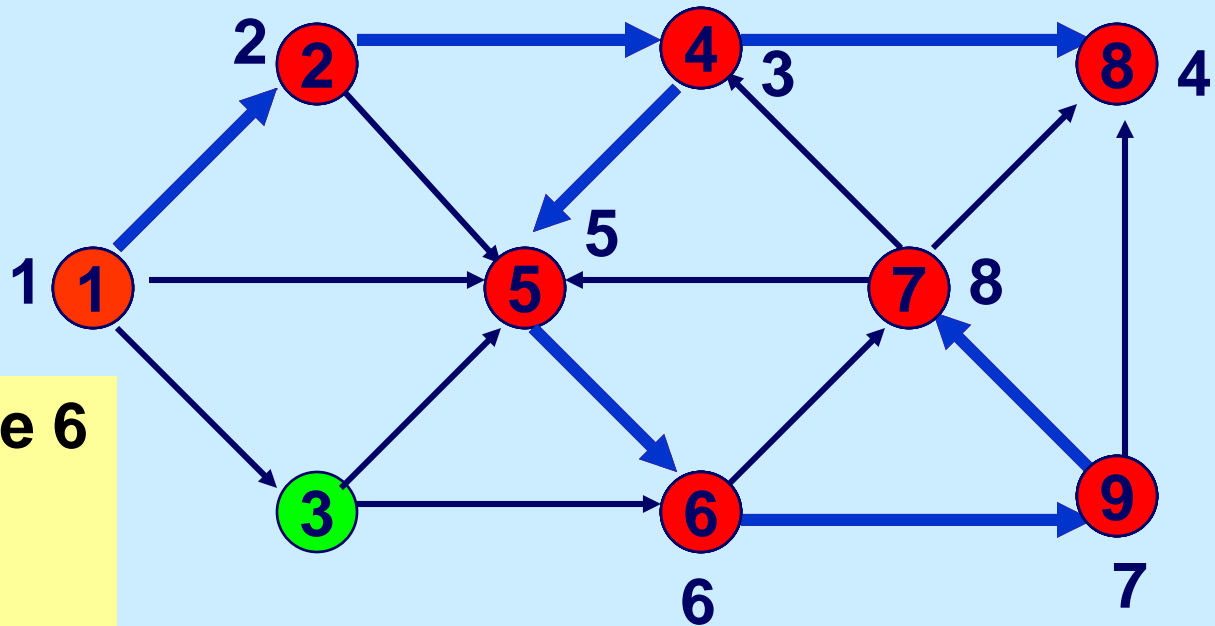
Delete node 9
from LIST

LIST	1	2	4	5	6				
------	---	---	---	---	---	--	--	--	--

next

8

Select node 6



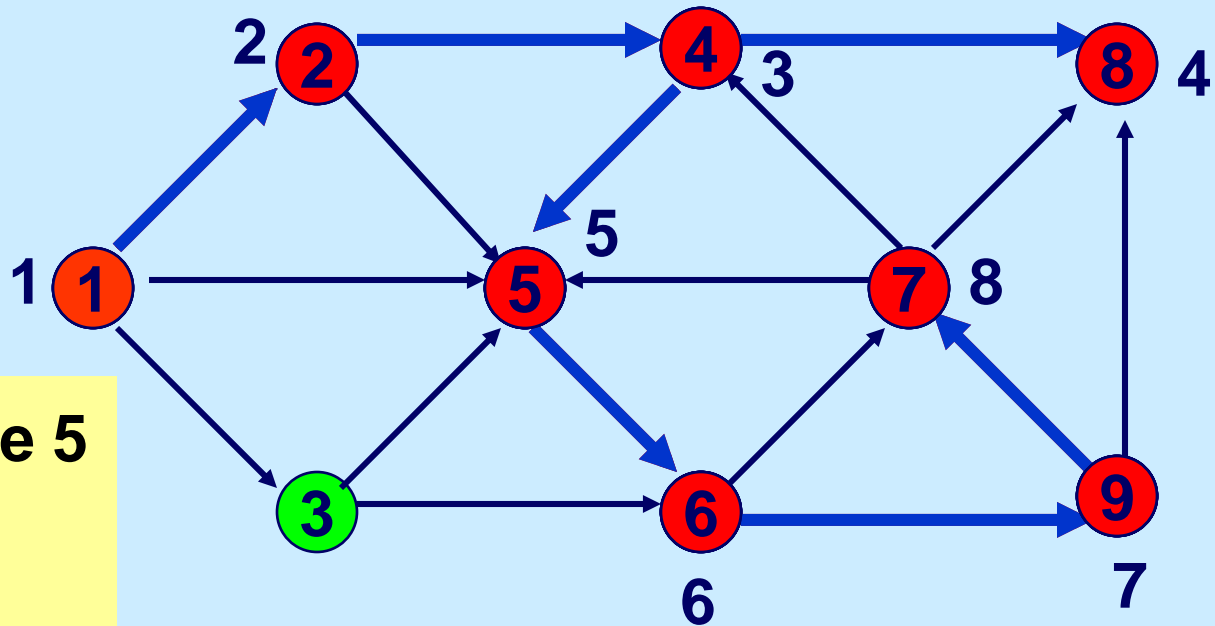
Delete node 6 from LIST

- LIST
- | | | | | | | | | |
|---|---|---|---|--|--|--|--|--|
| 1 | 2 | 4 | 5 | | | | | |
|---|---|---|---|--|--|--|--|--|

next

8

Select node 5



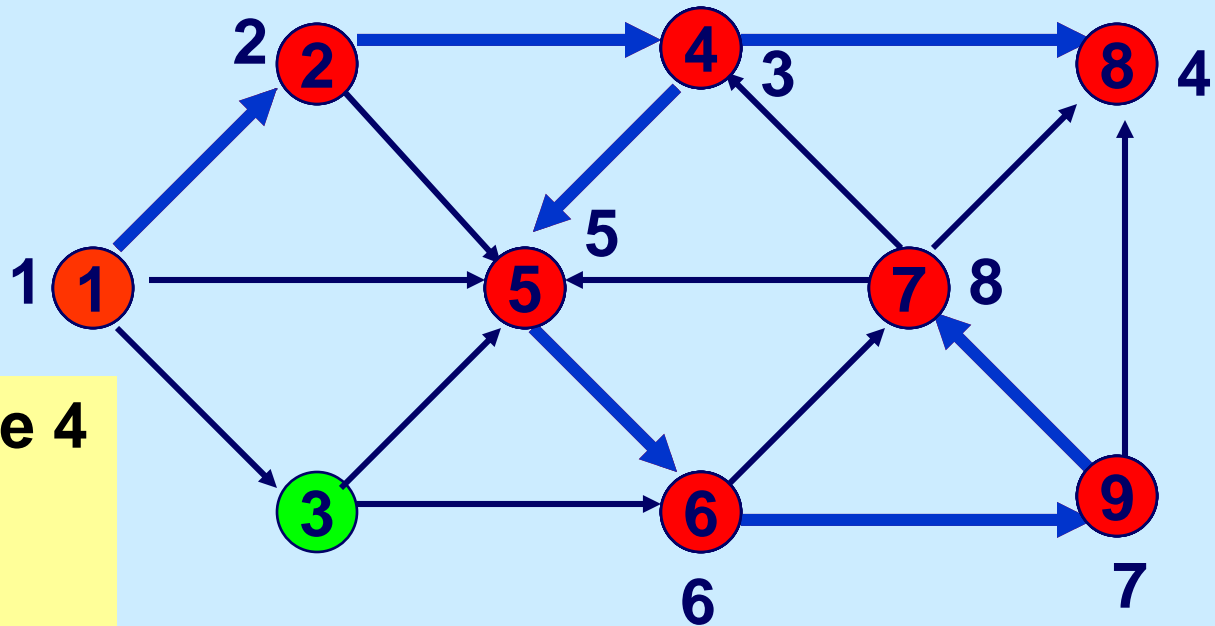
Delete node 5
from LIST

- LIST
- | | | | | | | | | |
|---|---|---|--|--|--|--|--|--|
| 1 | 2 | 4 | | | | | | |
|---|---|---|--|--|--|--|--|--|

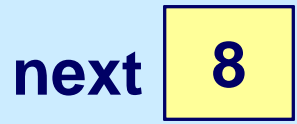
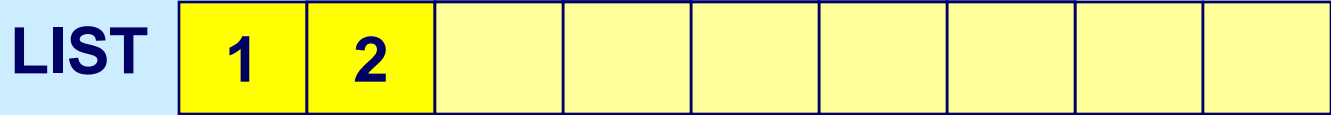
next

8

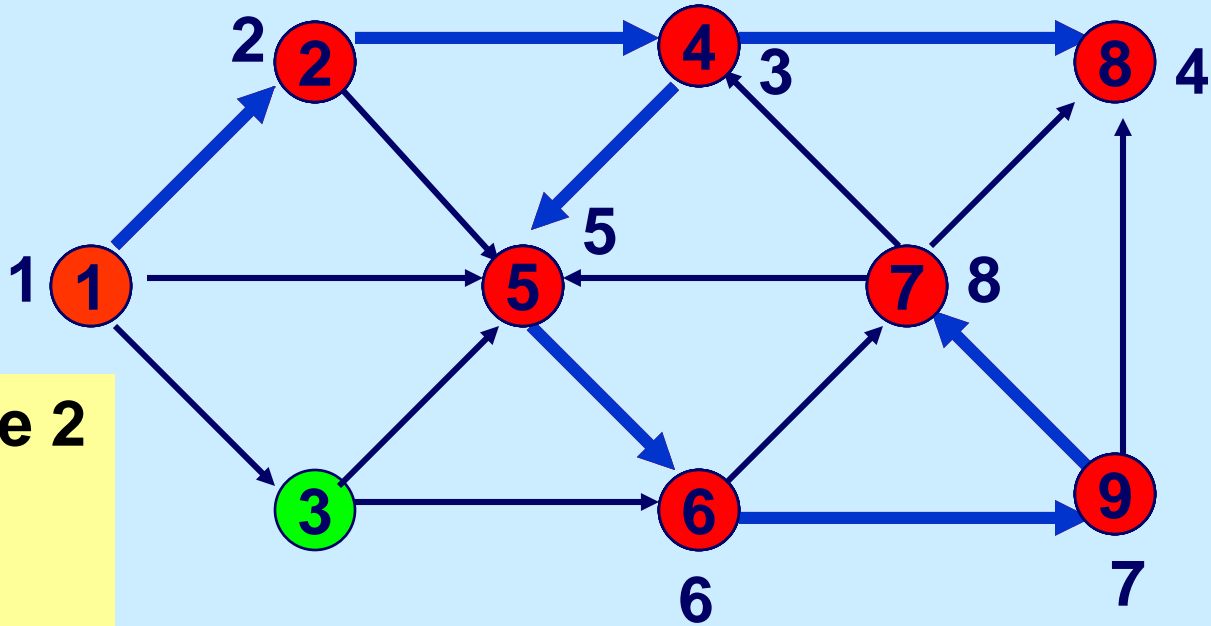
Select node 4



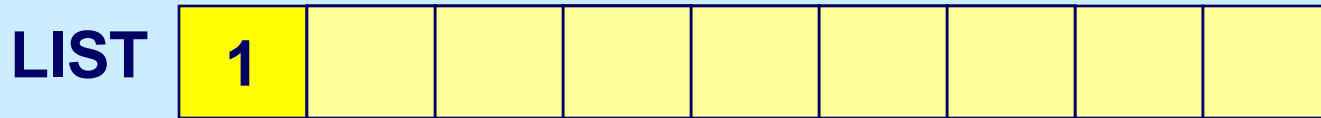
Delete node 4 from LIST



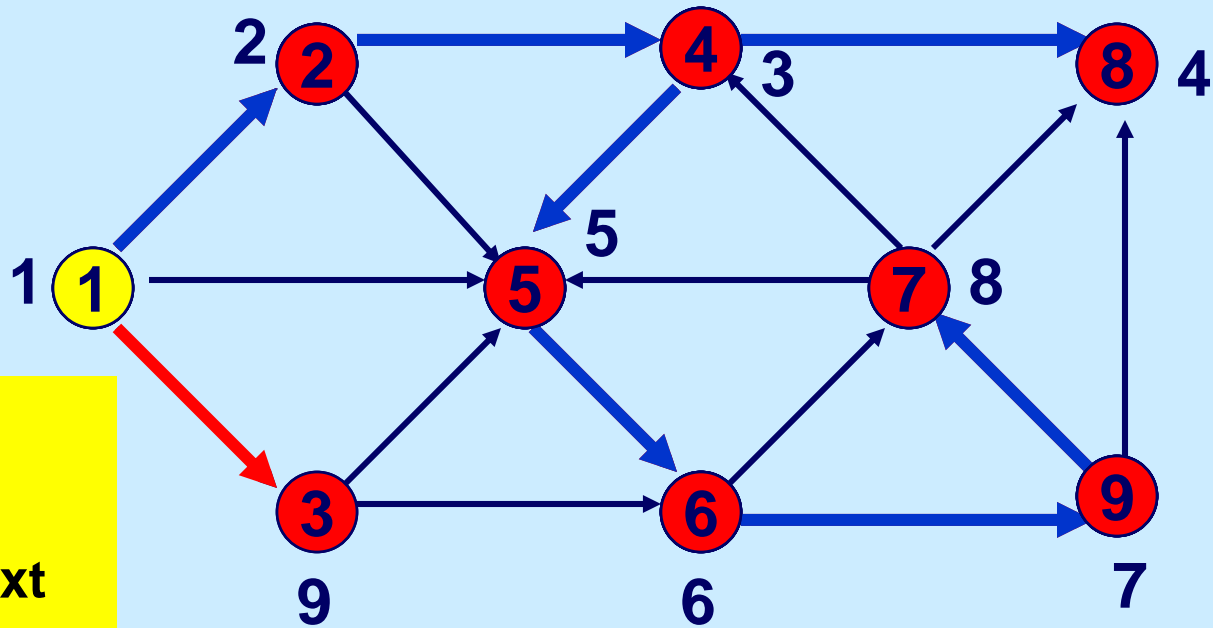
Select node 2



Delete node 2
from LIST



Select node 1

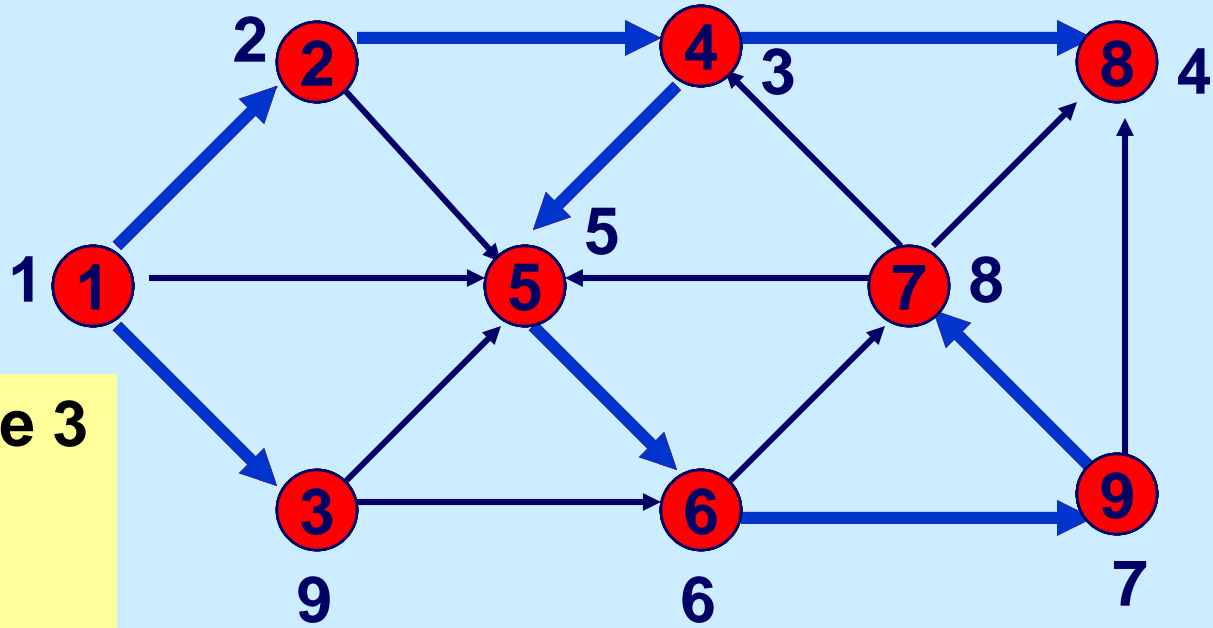


Next :=
Next + 1
order(j) := next
add j to LIST

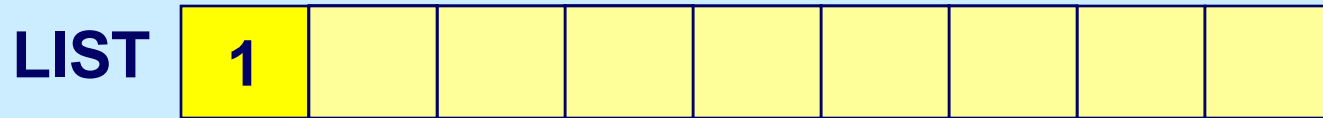
LIST	1	3							
------	---	---	--	--	--	--	--	--	--

next 9

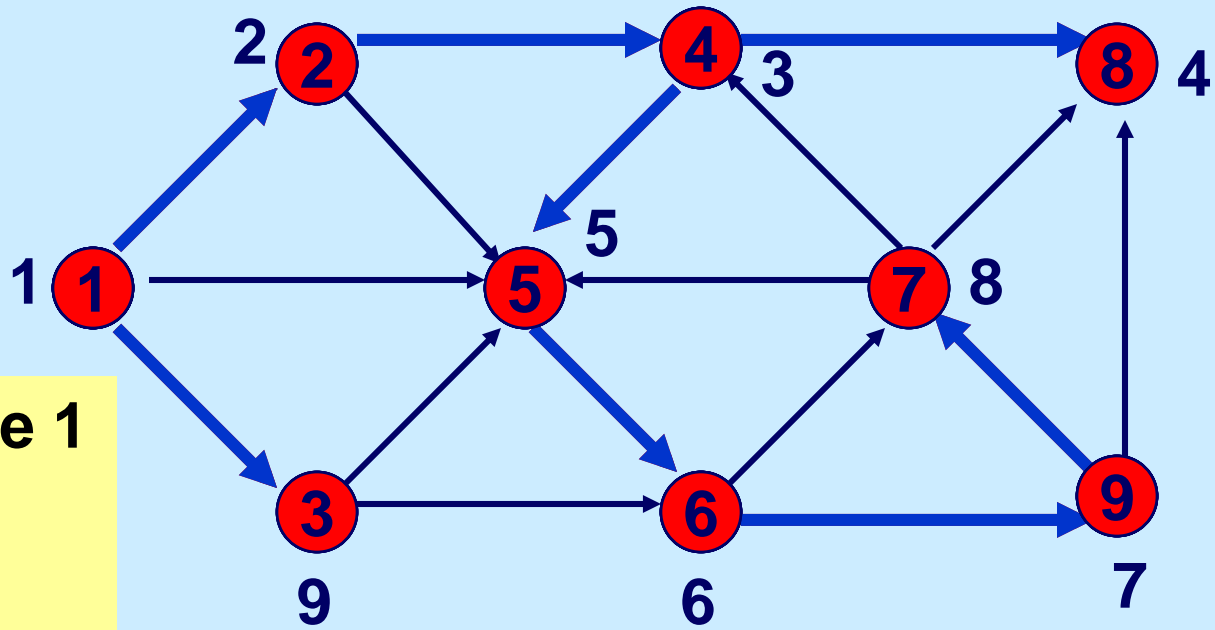
Select node 3



Delete node 3
from LIST

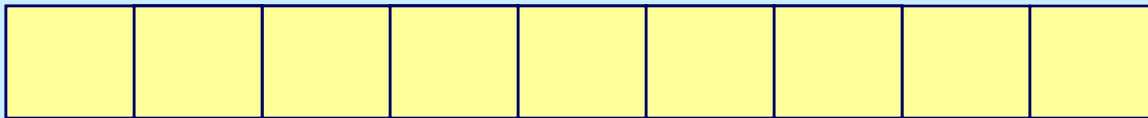


Select node 1



Delete node 1
from LIST

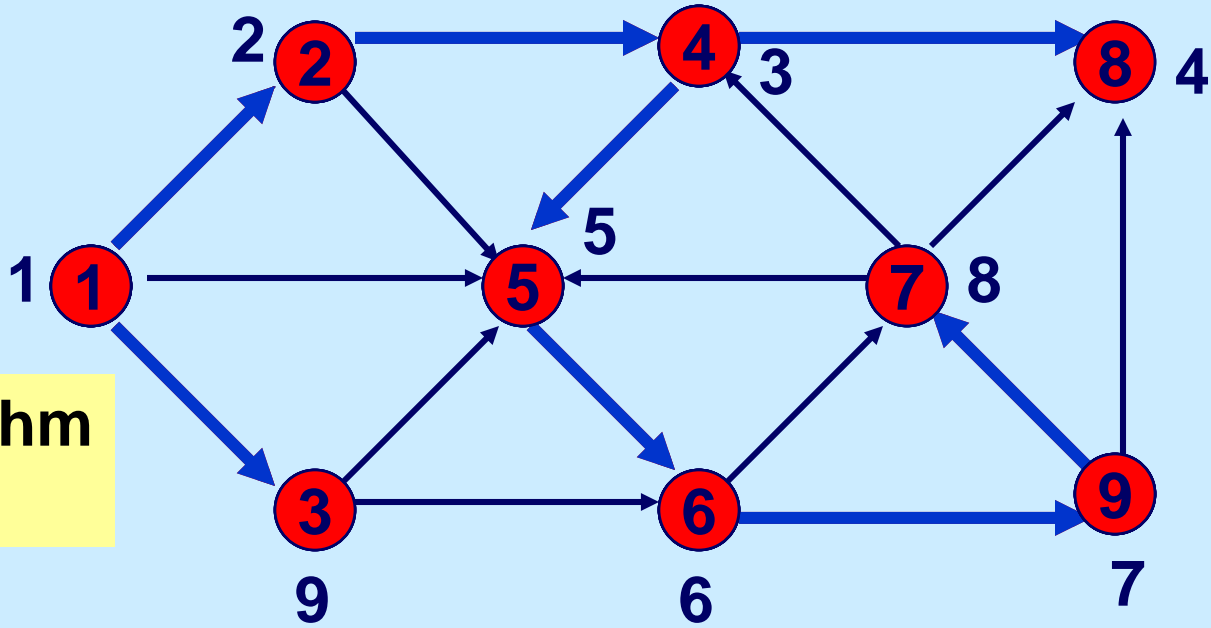
LIST



next

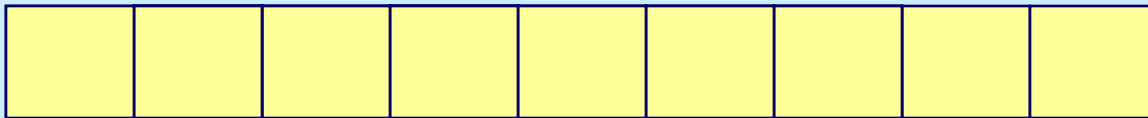
9

LIST is empty



The algorithm ends!

LIST



next

9

The depth first search tree

Note that each induced subtree has consecutively labeled nodes

