

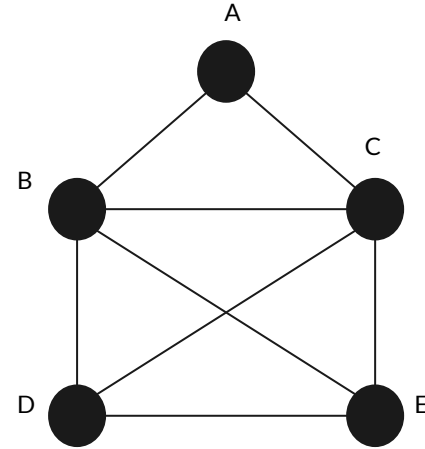


# **CIS 263 Introduction to Data Structures and Algorithms**

Graph Coloring

# Graph coloring

**Given** a Graph, we have color its nodes in a way that no two adjacent nodes have the same color (i.e. each edge ends at different color vertices)

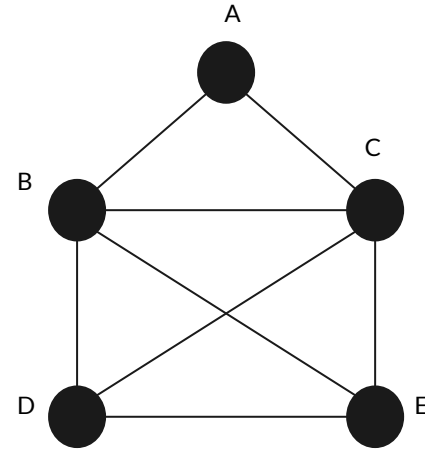


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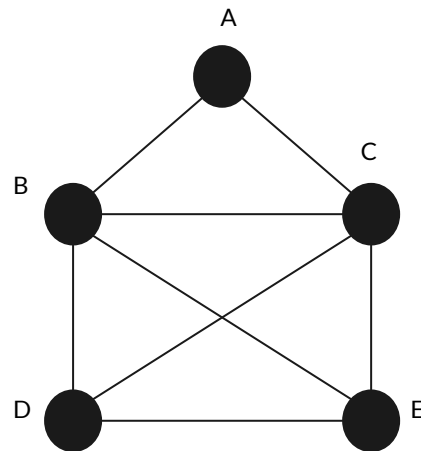
Traversal seq

A	B	C	D	E
---	---	---	---	---



# Graph coloring

Greedy Algorithm



Traversal seq

A	B	C	D	E
---	---	---	---	---






# Graph coloring

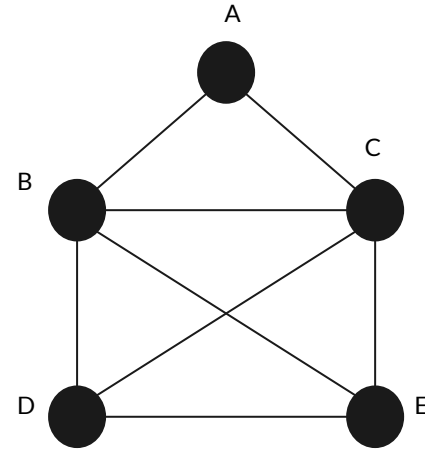
## Greedy Algorithm

- Ordered list of colors

Traversal seq

A	B	C	D	E
---	---	---	---	---

				
1	2	3	4	5

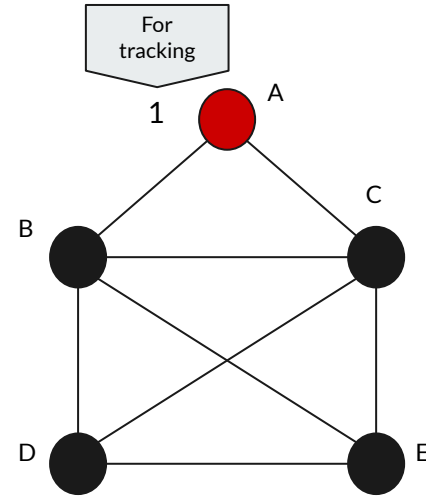
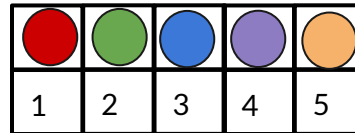
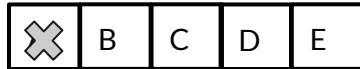


# Graph coloring

## Greedy Algorithm

- Ordered list of colors
- Starting node: color with the initial index

Traversal seq

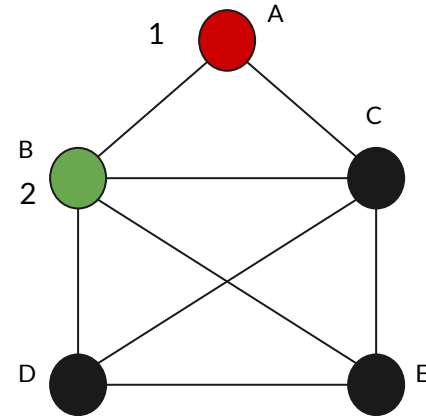
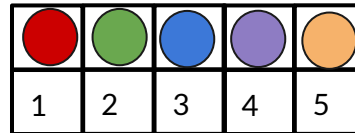
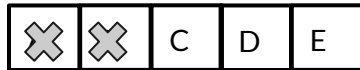


# Graph coloring

## Greedy Algorithm

- Ordered list of colors
- Starting node: color with the initial index
- **Go to the next neighbour, color it**
  - with the minimum available index (non replaceable) exclusive to the already labeled (colored) neighbor's indices
  - Iterate

Traversal seq

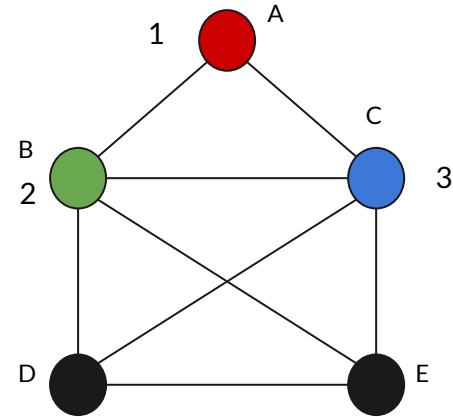
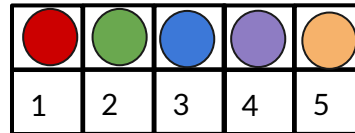


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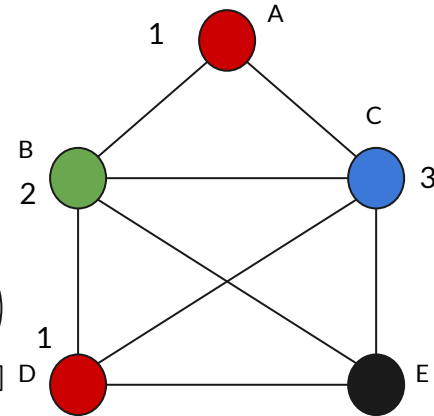
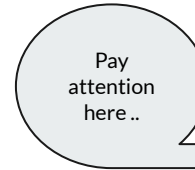
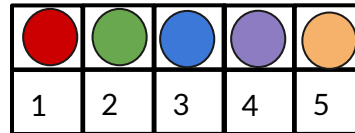


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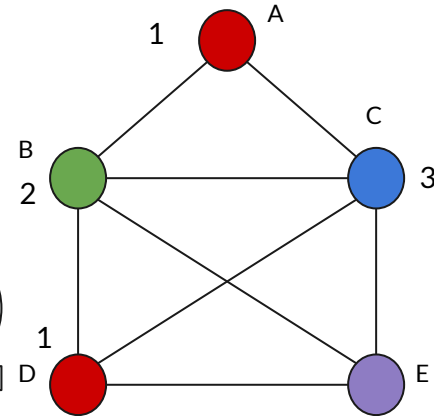
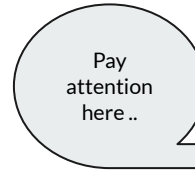
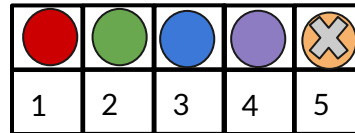
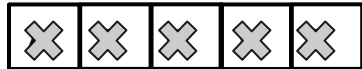


# Graph coloring

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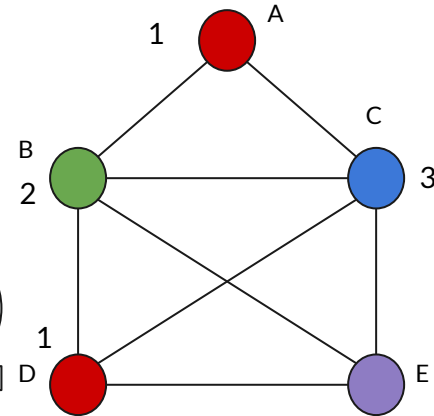


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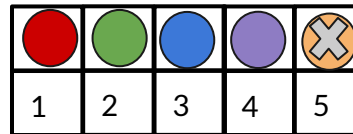
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  - Iterate
- **Solution: 4 colours (chromatic number) graph**

Pay attention here..



Traversal seq





# Summary

- Given a Graph, we used a **Greedy Algorithm** to perform graph coloring.