

Graph Theory

Introduction

Computational Thinking

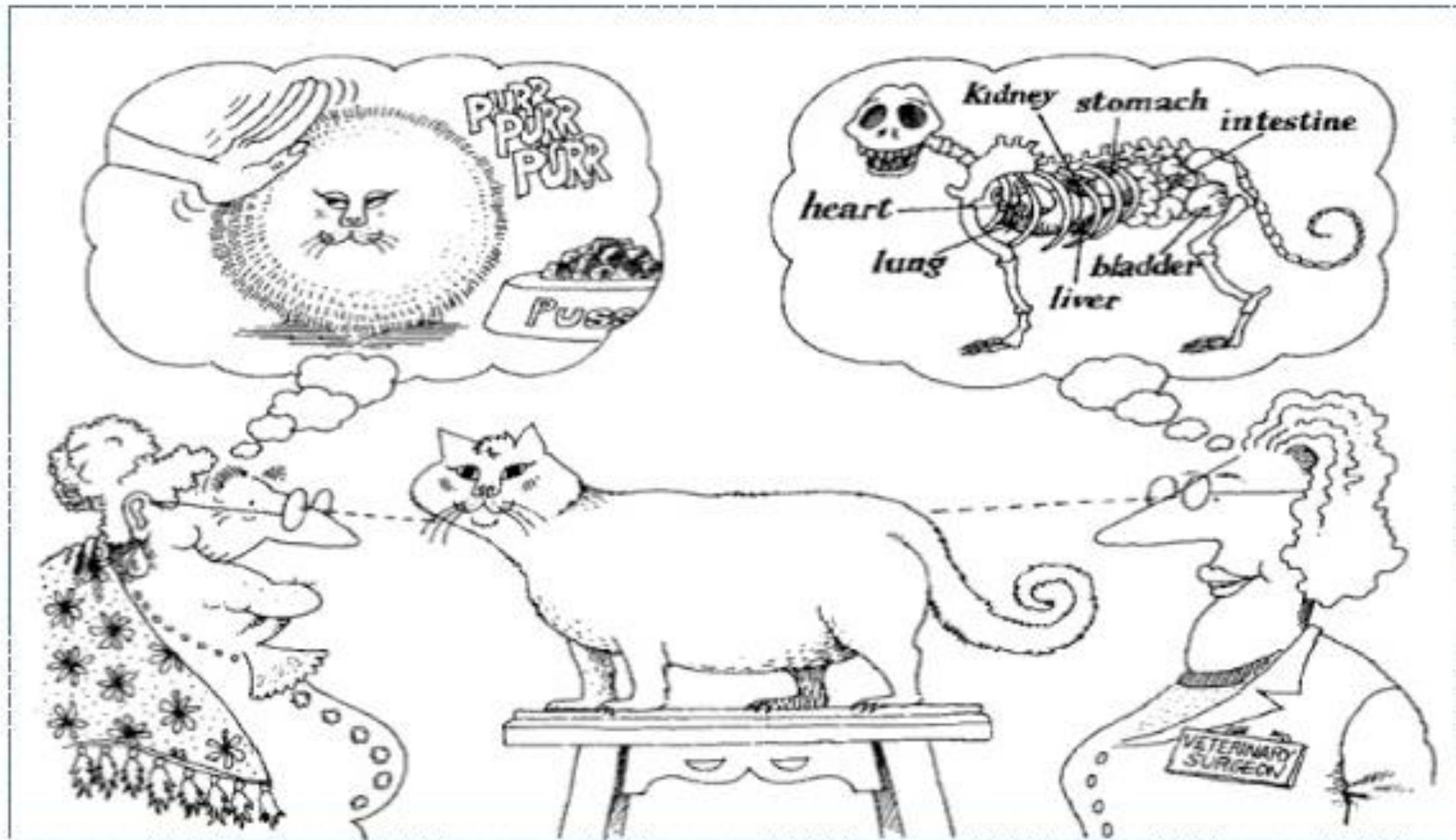
Computational thinking is about designing and evaluating potential solutions to problems – often through programming.

The concepts of computational thinking include:

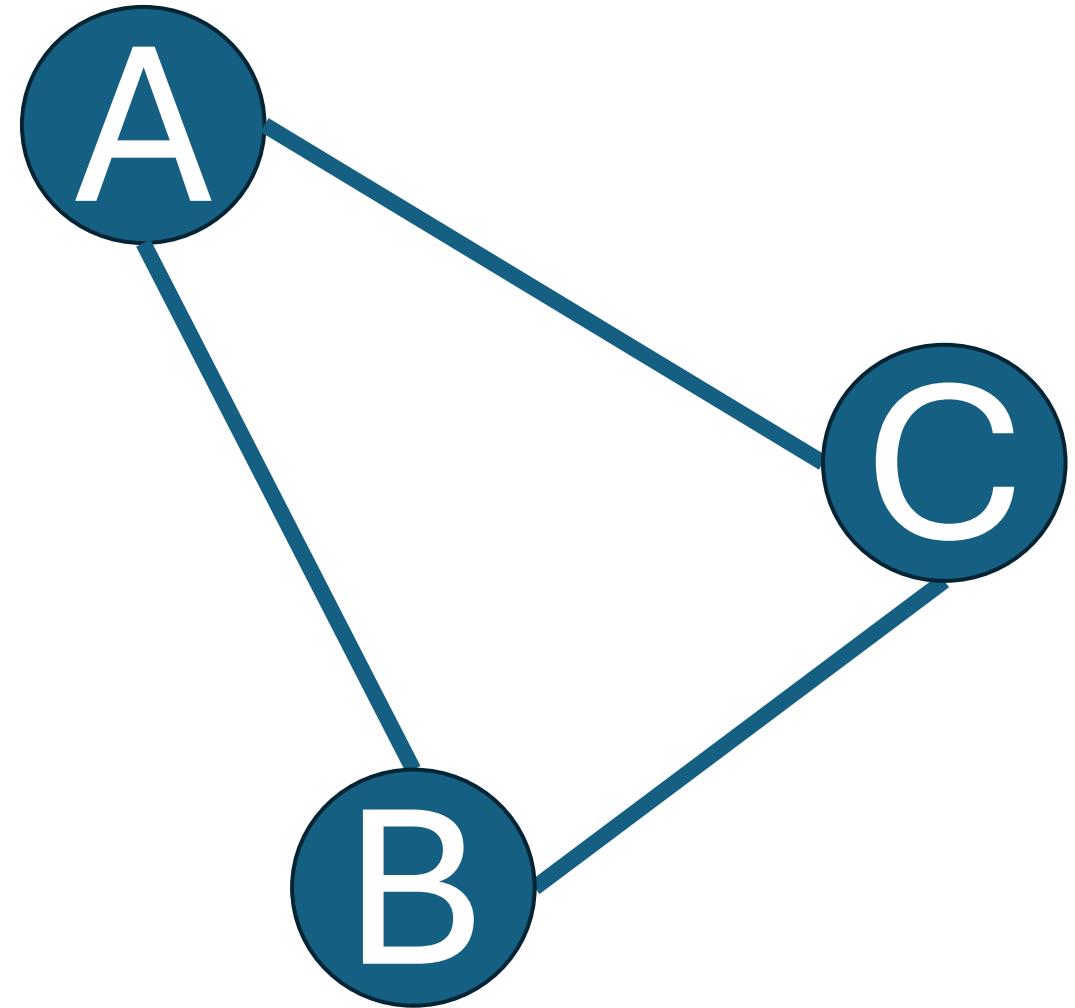
1. **abstraction** (reduction of complex tasks to essentials)
2. **decomposition** (breakdown of a problem into steps)
3. **pattern recognition** (identification of similar problems)
4. **algorithms** (series of steps to complete a task)

Abstraction

(reduction of complex tasks to essentials)



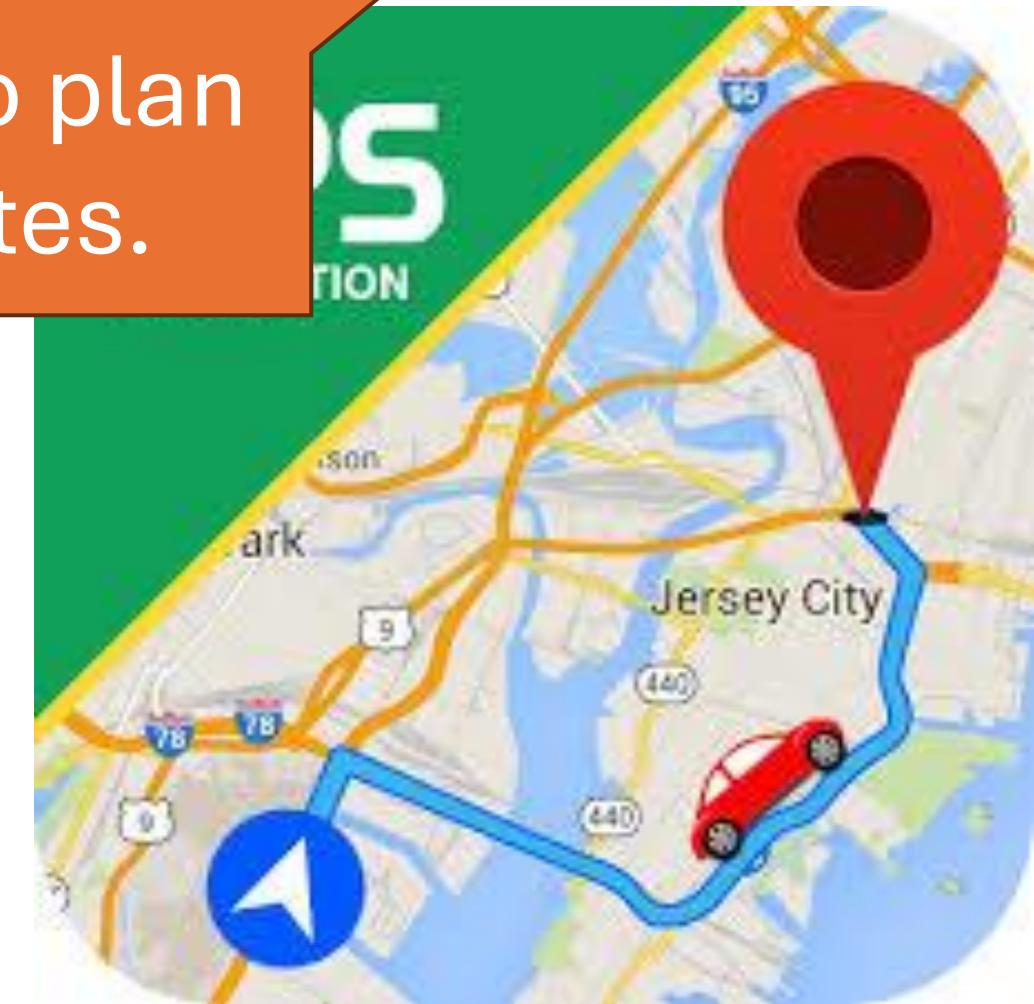
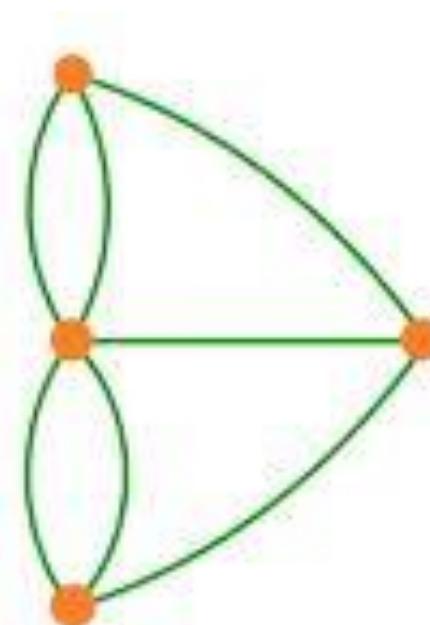
Graphs in
Graph Theory
look like this.



Graphs can be used to model roads and cities.

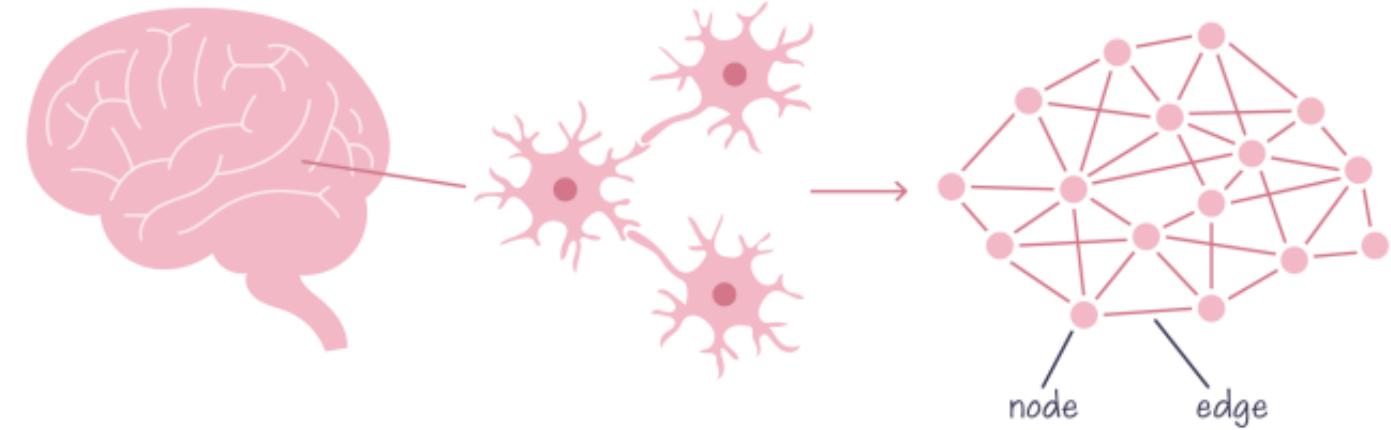


GPS uses this to plan routes.



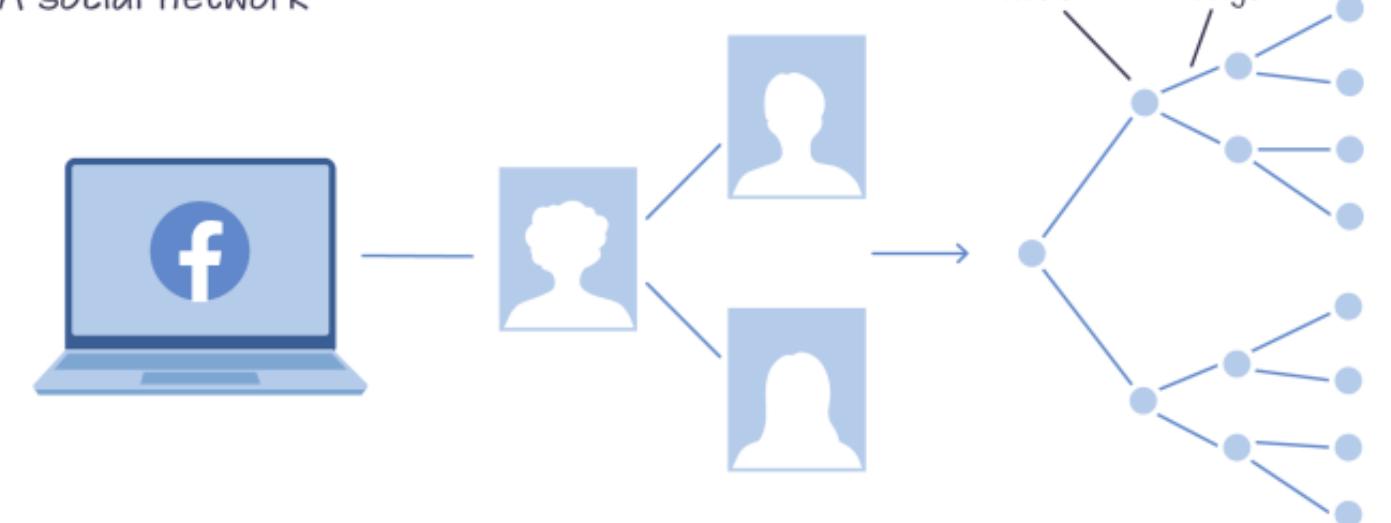
Graphs can be used to model neural networks.

A neural network



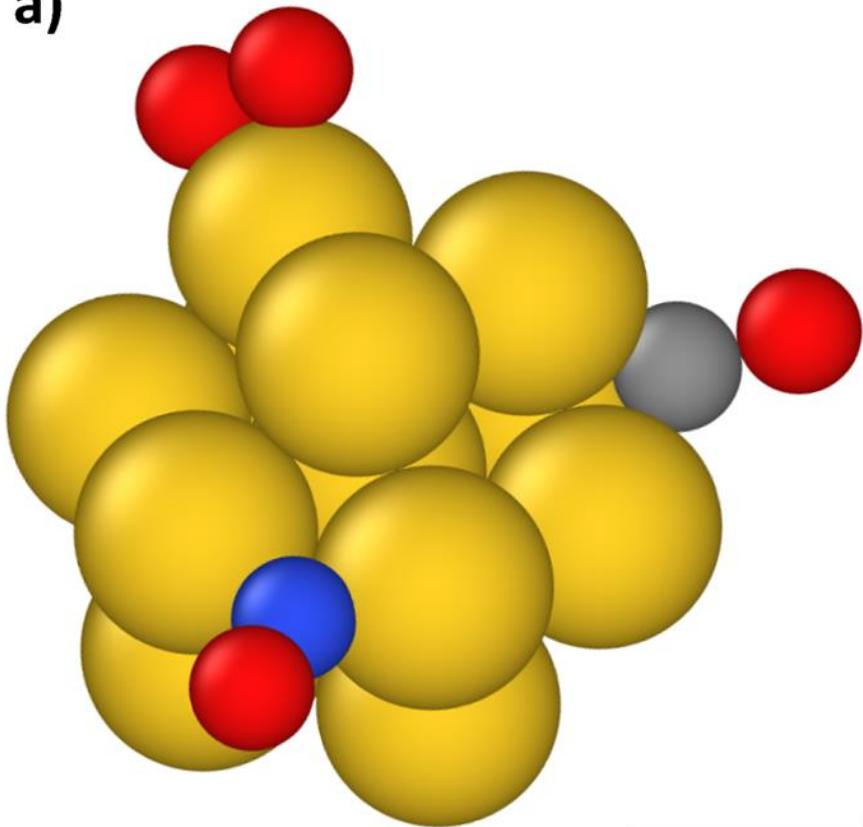
Graphs can be used to model social networks.

A social network

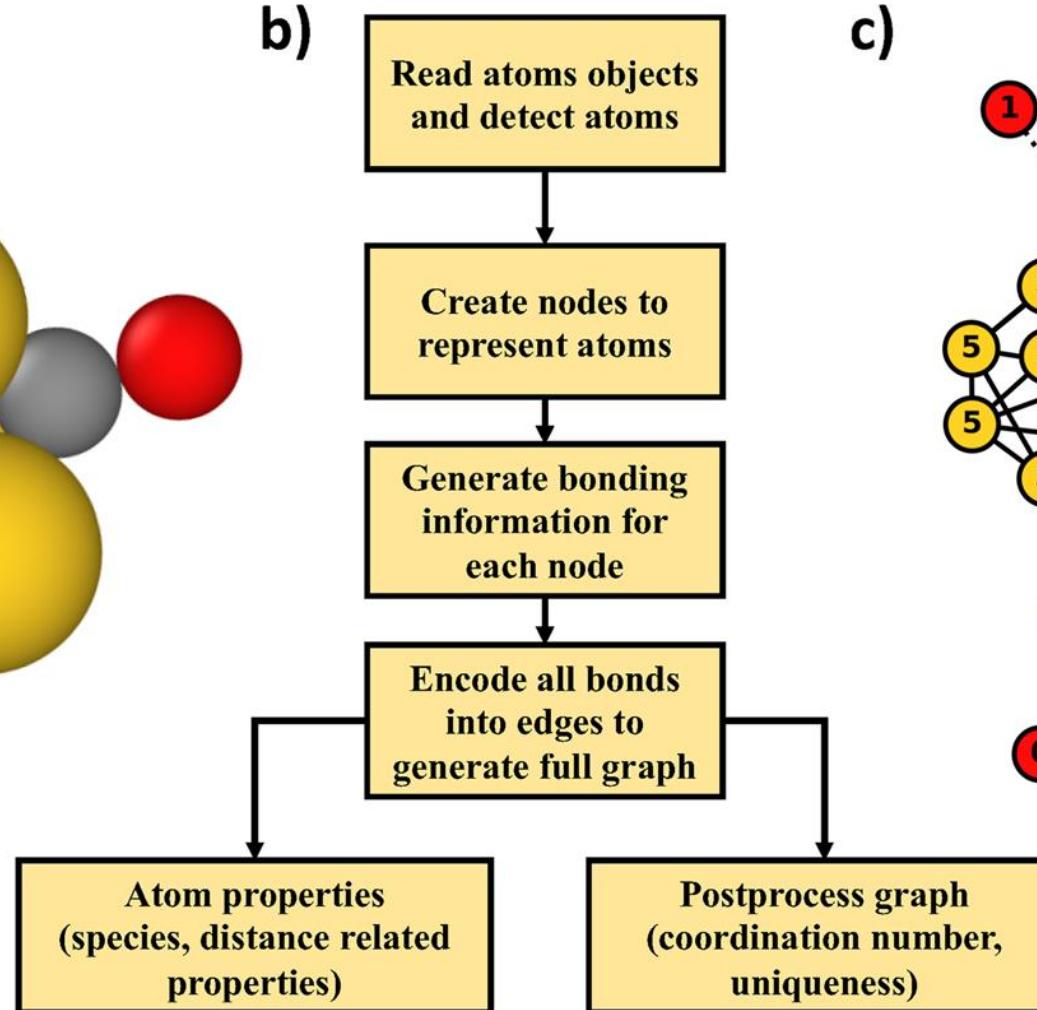


Graphs can be used to model ATOMS in CHEMISTRY

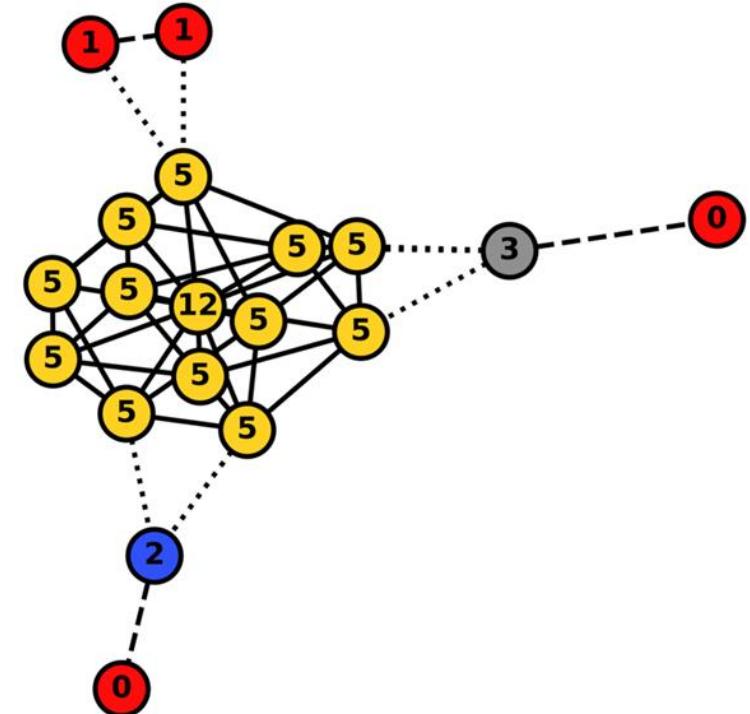
a)

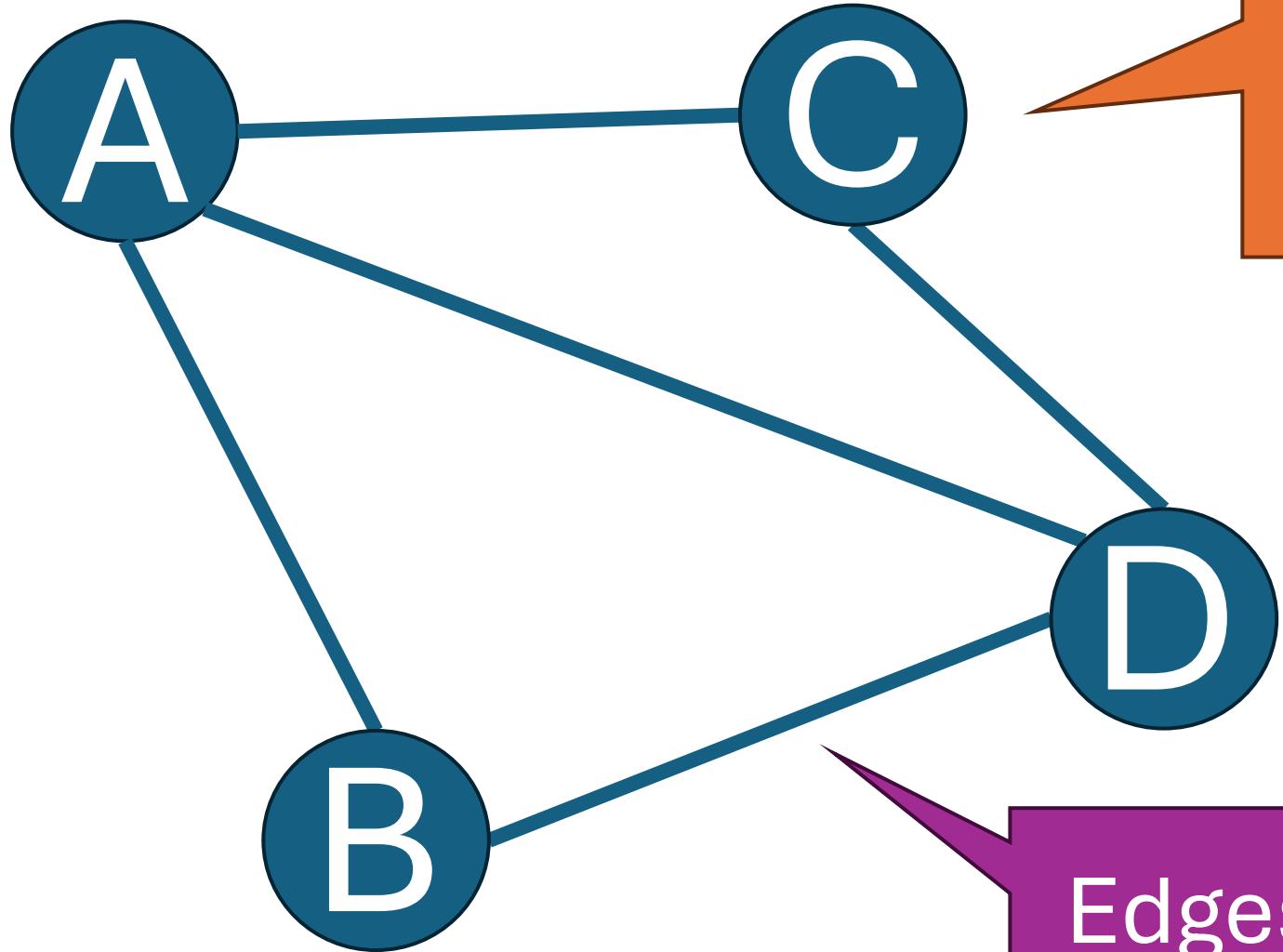


b)



c)

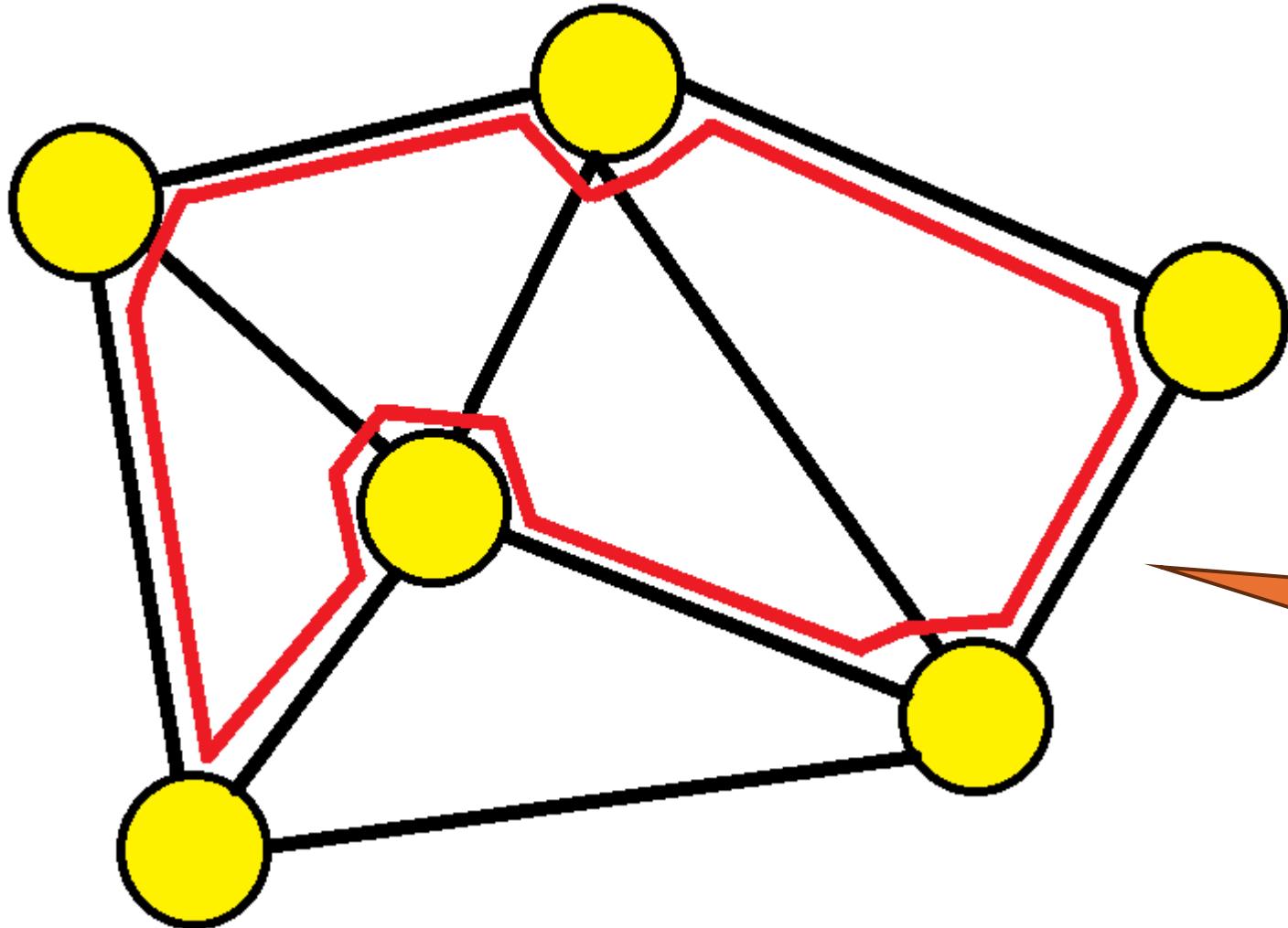




Node or
Vertex

Vertices

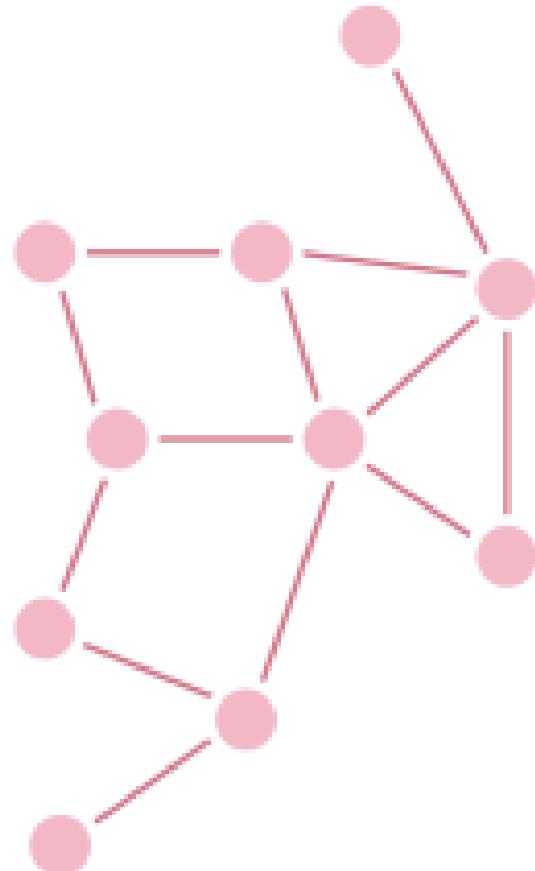
Edges



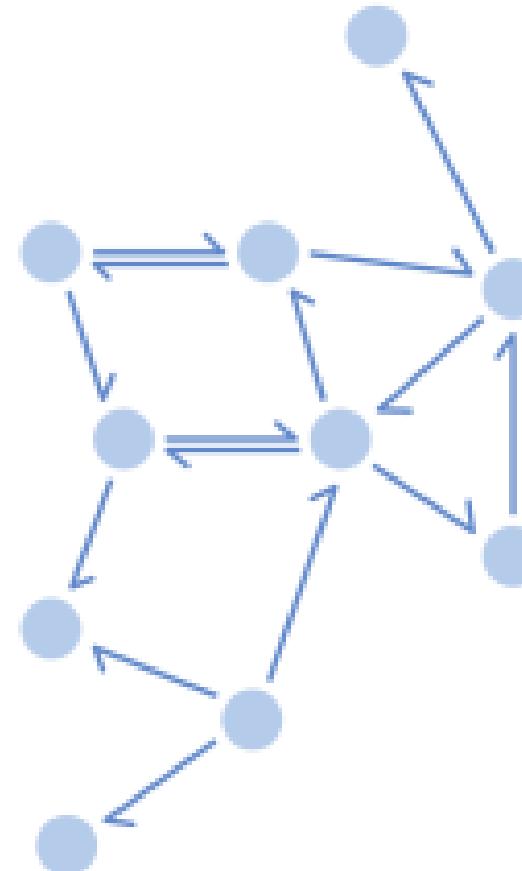
Path

Edges can have directions (arrows)
and weights (numbers)

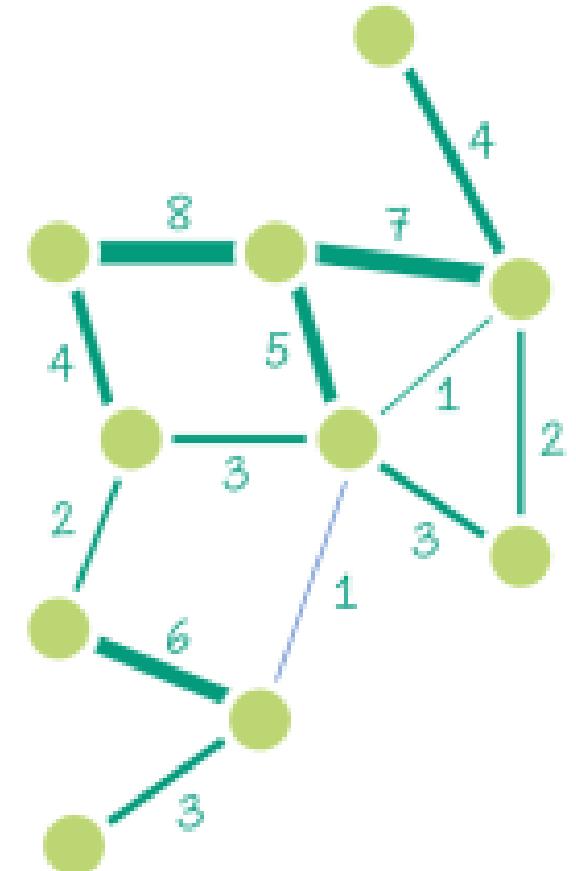
undirected

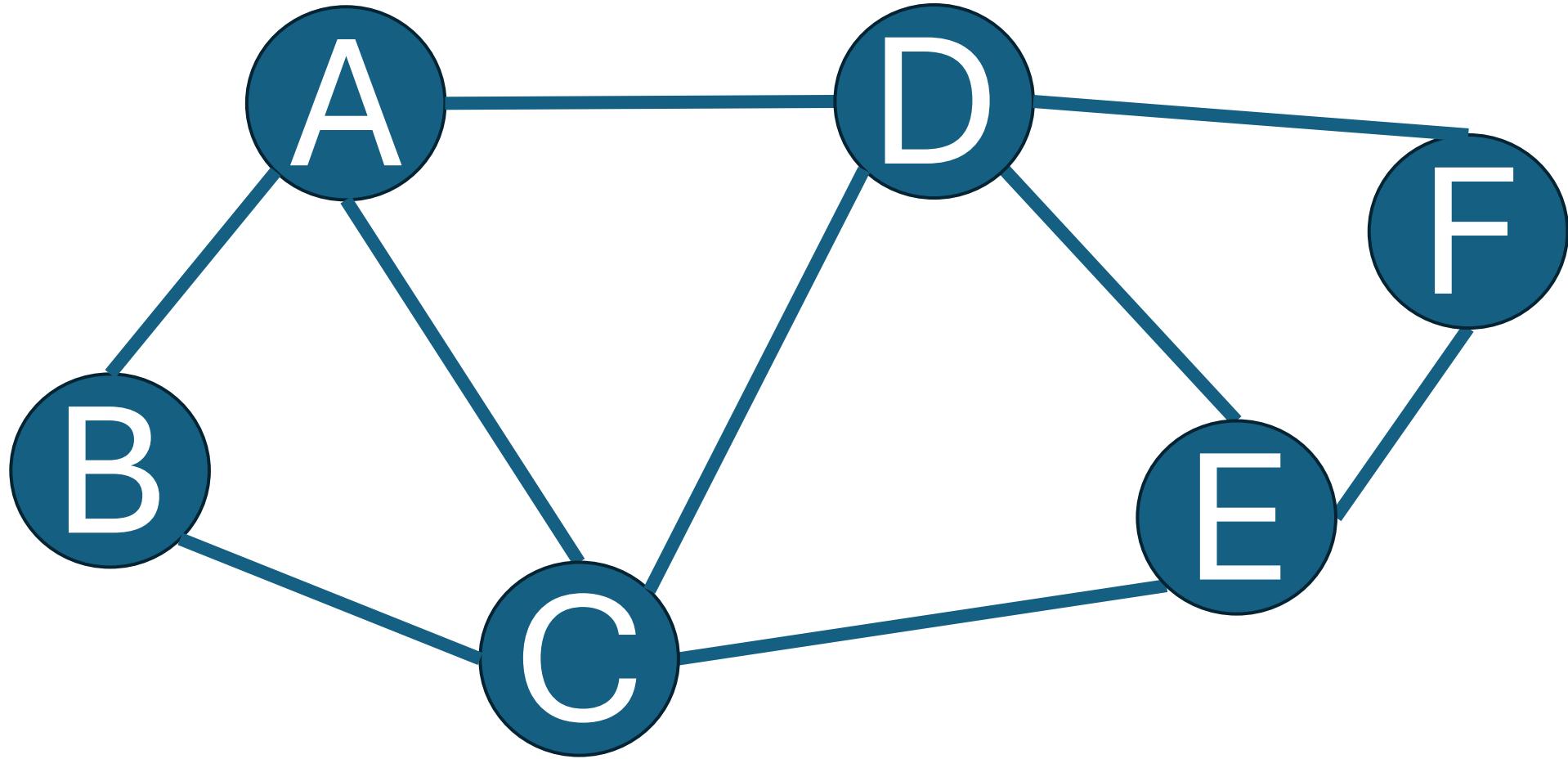


directed



weighted

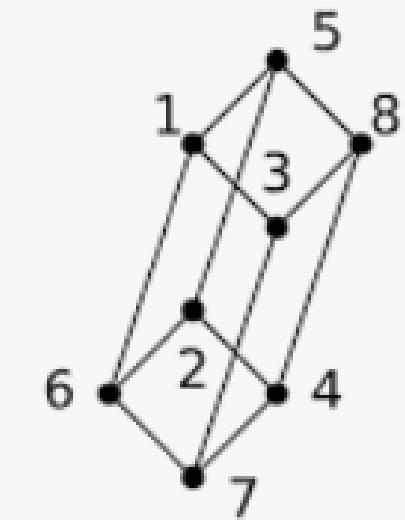
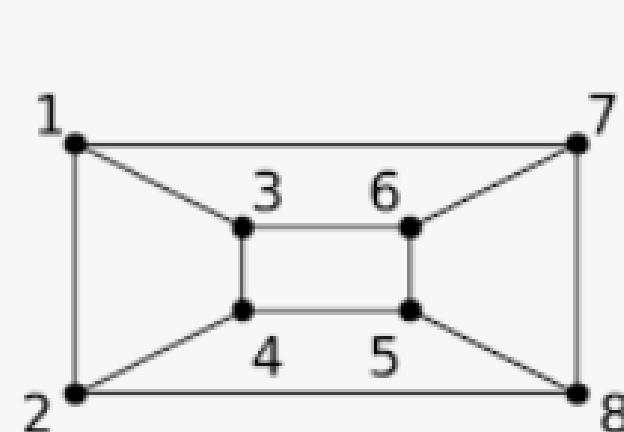
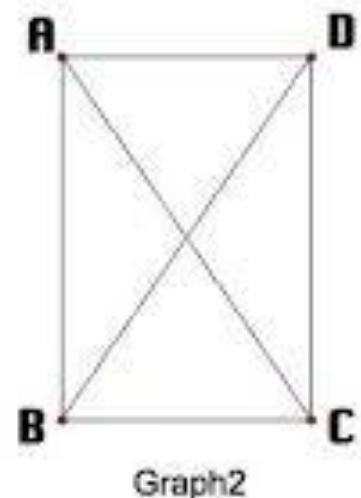
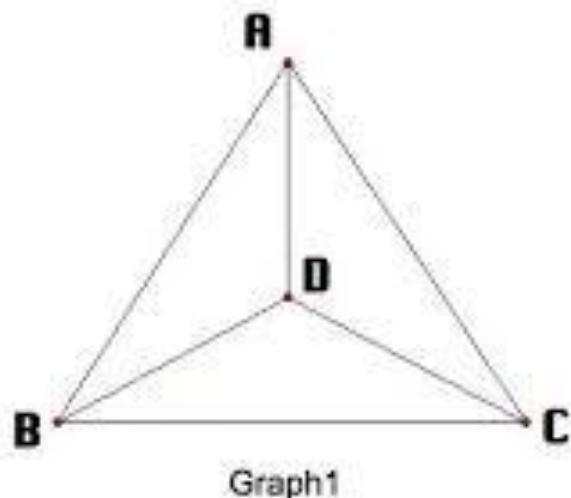
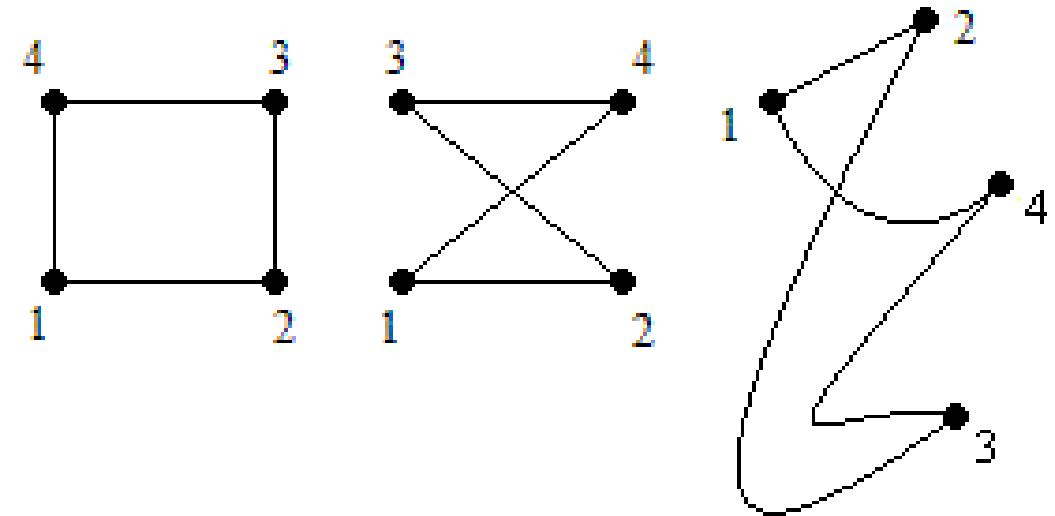




How many
nodes?

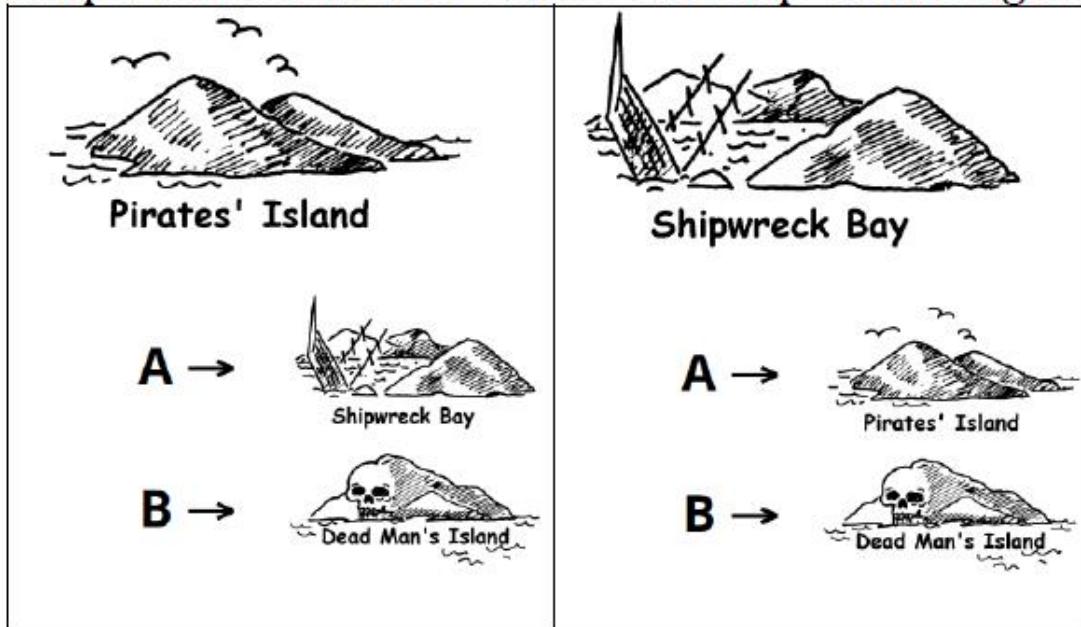
How many
edges?

It is possible to draw an equivalent graph that looks very similar.



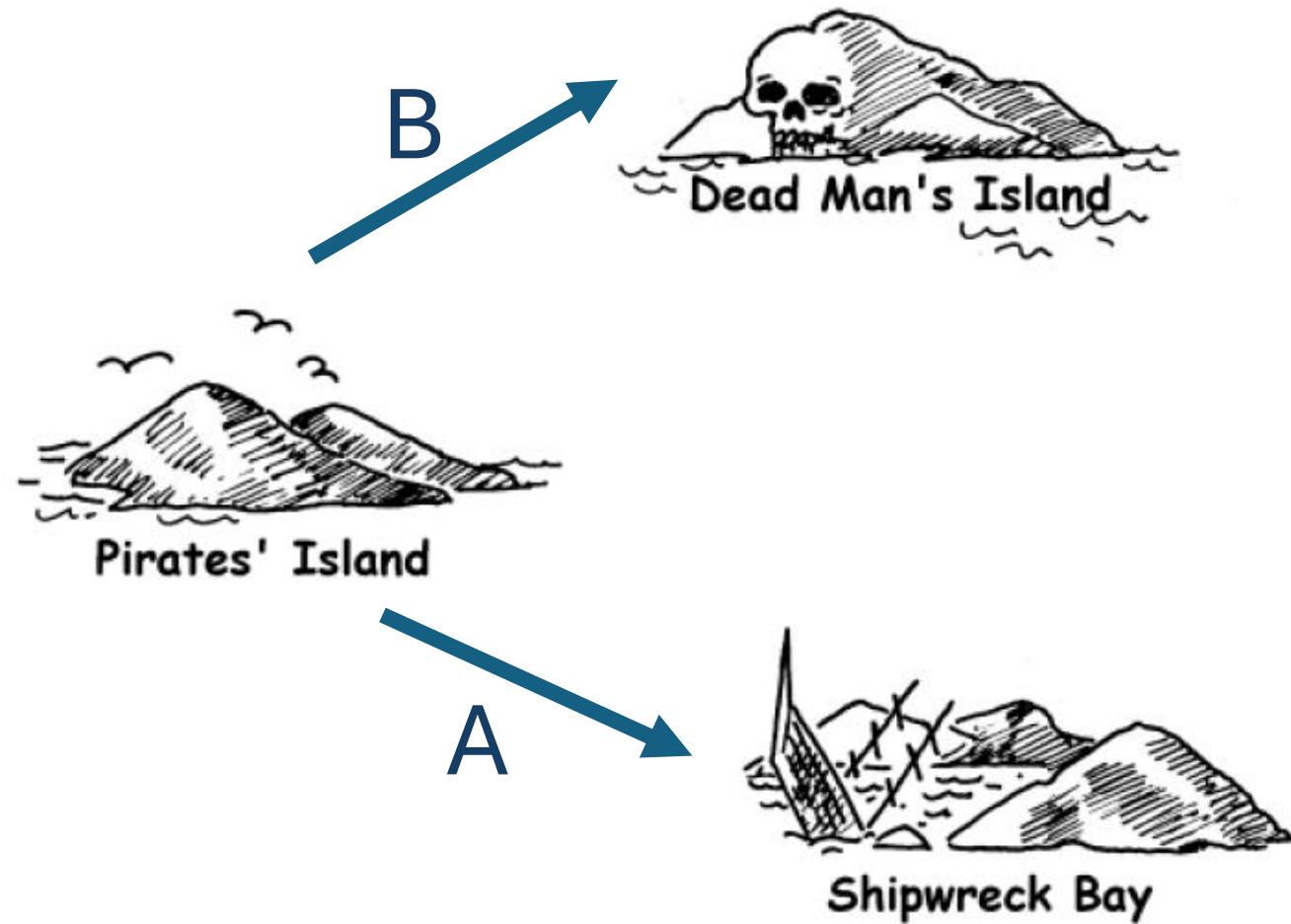
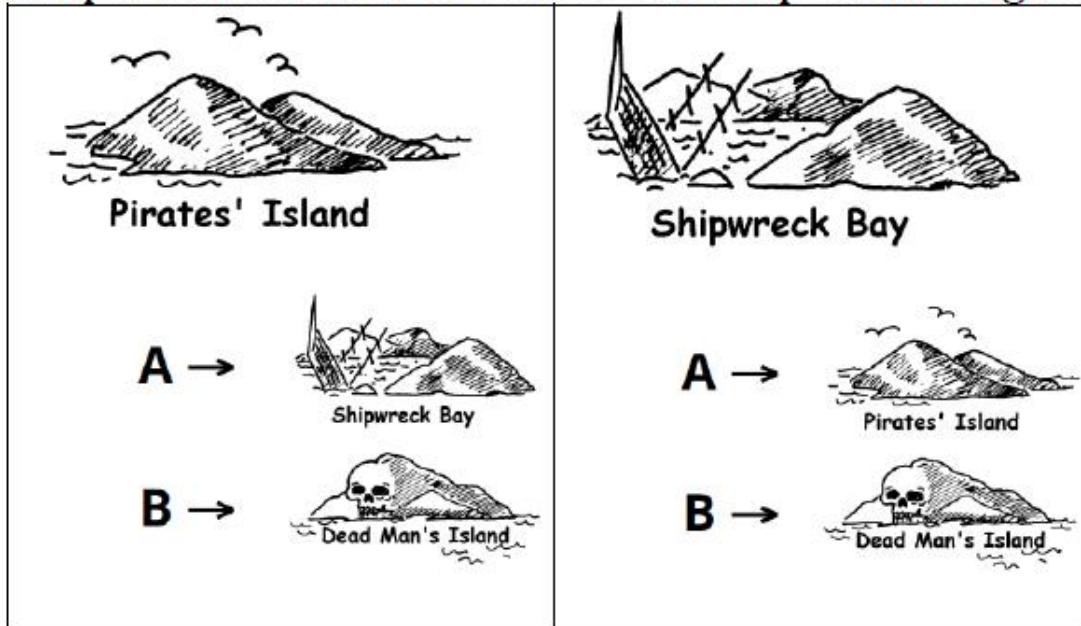
6. Create the network for this data. You will need to add the edges. The islands will act as nodes.

Graph information to add to the map on the right.



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