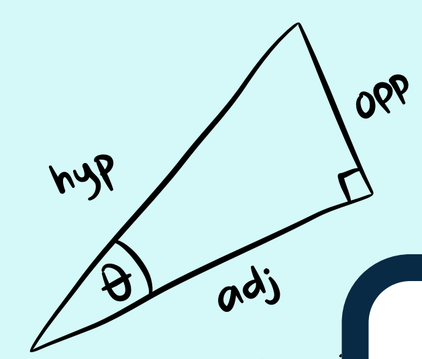
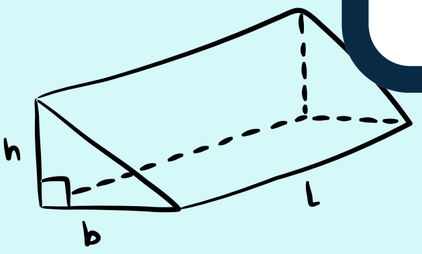
Discrete Mathamatics





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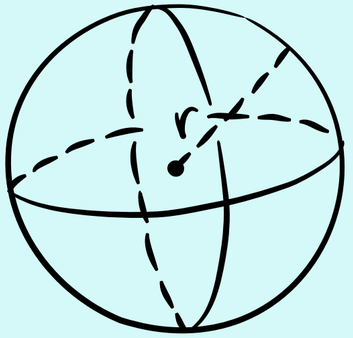
B.tech CSE 2nd year (3rd Sem)
Presenting to- Mrs. Kalyani Joshi

$$\frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$y = mx + b$$



$$V = \frac{4}{3}\pi r^3$$

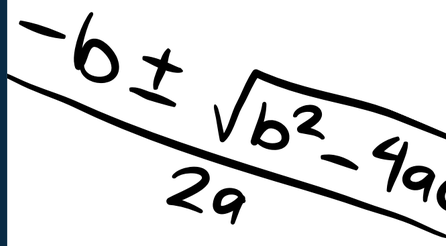
TOPIC:

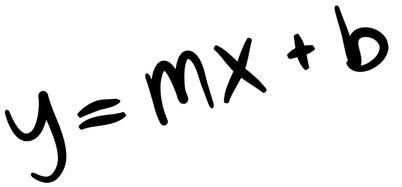
Weighted graph

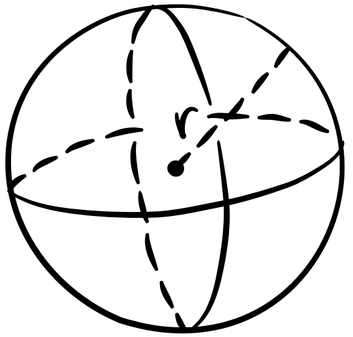
Paths and circuits

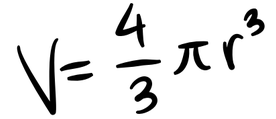
Shortest path in weighted graphs

Eurlerian path and circuits



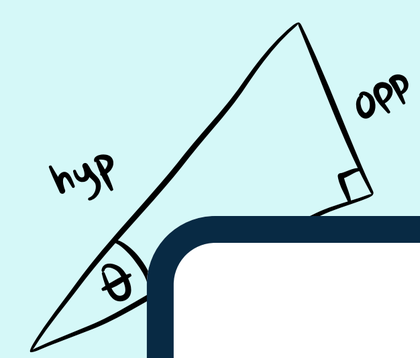


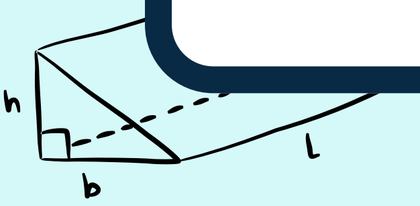




Weighted graph

A weighted graph is defined as a special type of graph in which the edges are assigned some weights which represent cost, distance, and many other relative measuring units





$V = \frac{1}{2}bhl$

$\frac{x}{a} + \frac{y}{b} = 1$

$ax^2 + bx + c = 0$

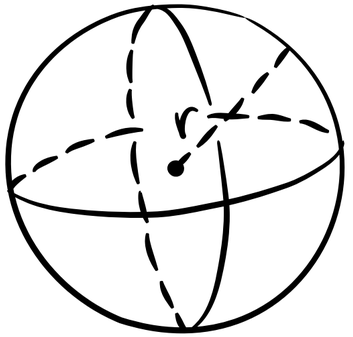
$V = \frac{4}{3}\pi r^3$

Applications of Weighted Graph

- 2D matrix games: In 2d matrix, games can be used to find the optimal path for maximum sum along starting to ending points and many variations of it can be found online.
- Spanning trees: Weighted graphs are used to find the minimum spanning tree from graph which depicts the minimal cost to traverse all nodes in the graph.
- Constraints graphs: Graphs are often used to represent constraints among items. Used in scheduling, product design, asset allocation, circuit design, and artificial intelligence.
- Epidemiology: Weighted graphs can be used to find the maximum distance transmission from an infectious to a healthy person
- Transportation networks: Using weighted graphs, we can figure things out like the path that takes the least time, or the path with the least overall distance.
- Network packet traffic graphs: Network packet traffic graphs are used for analyzing network security, studying the spread of worms, and tracking criminal or non-criminal activity.

$$\frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$y = mx + b$$



$$V = \frac{4}{3}\pi r^3$$

ADVANTAGES AND DISADVANTAGES

Advantages -

Better representation of real-world scenarios

More accurate pathfinding

More efficient algorithms

More flexible analysis

Ability to model uncertainty:

Disadvantages -

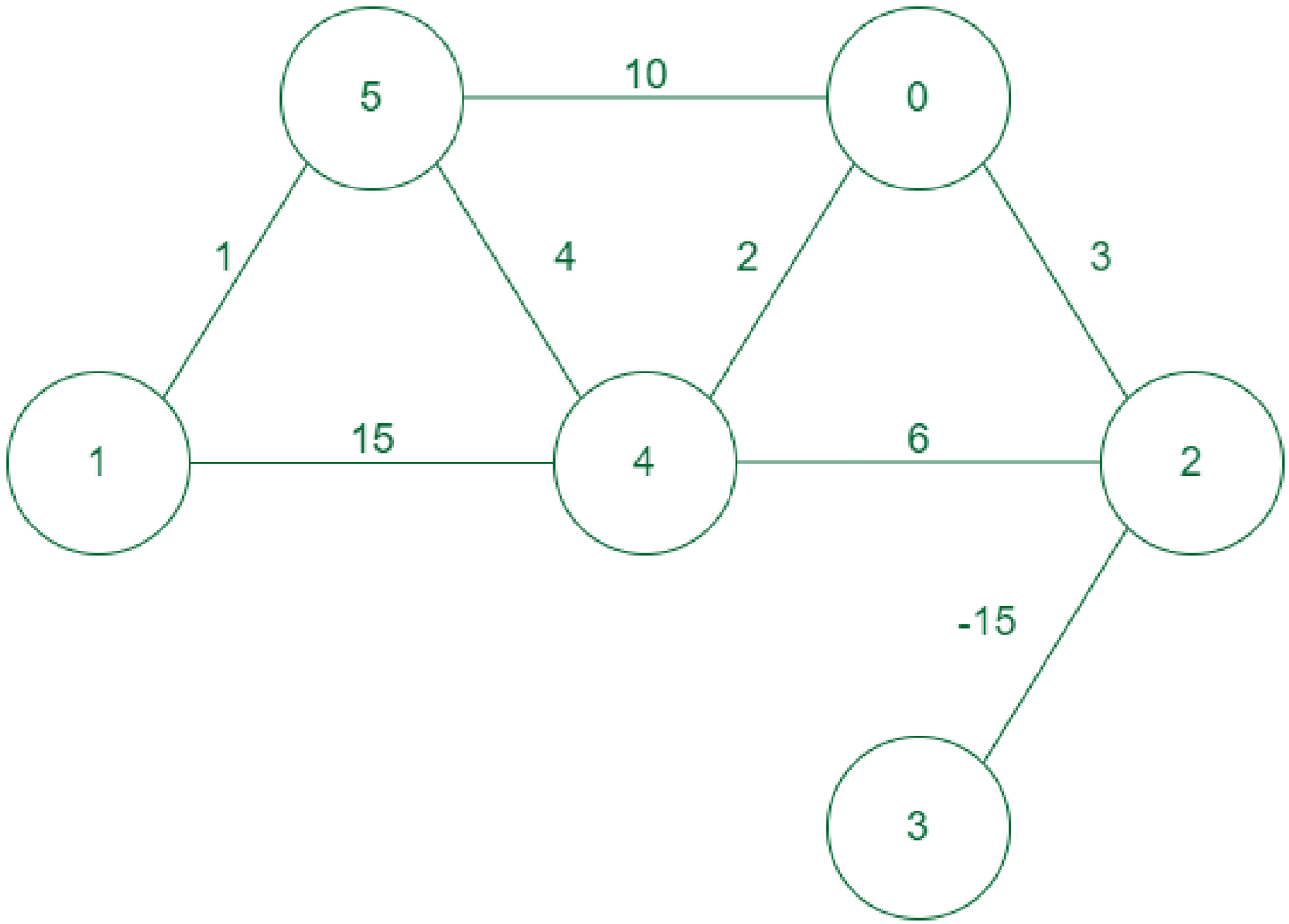
Increased complexity

Higher memory usage

More difficult to maintain

Not suitable for all applications

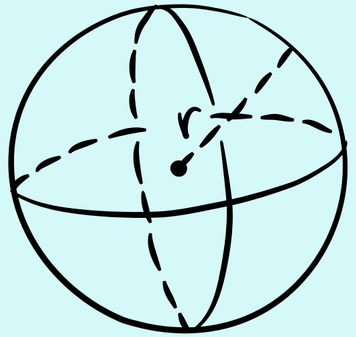
Bias towards certain properties



Example of weighted graph

$$\frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$y = mx + b$$



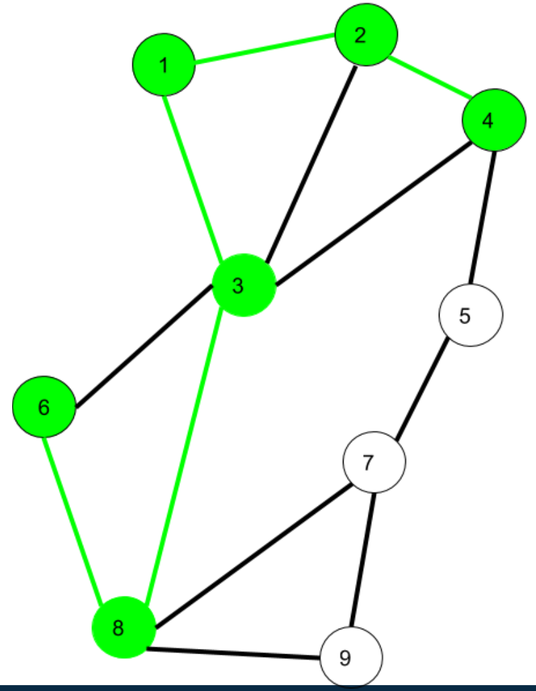
$$V = \frac{4}{3}\pi r^3$$

Paths and circuits

Path- It is a trail in which neither vertices nor edges are repeated i.e. if we traverse a graph such that we do not repeat a vertex and nor we repeat an edge. As path is also a trail, thus it is also an open walk.

Circuit - A circuit can be described as a closed walk where no edge is allowed to repeat. In the circuit, the vertex can be repeated. A closed trail in the graph theory is also known as a circuit.

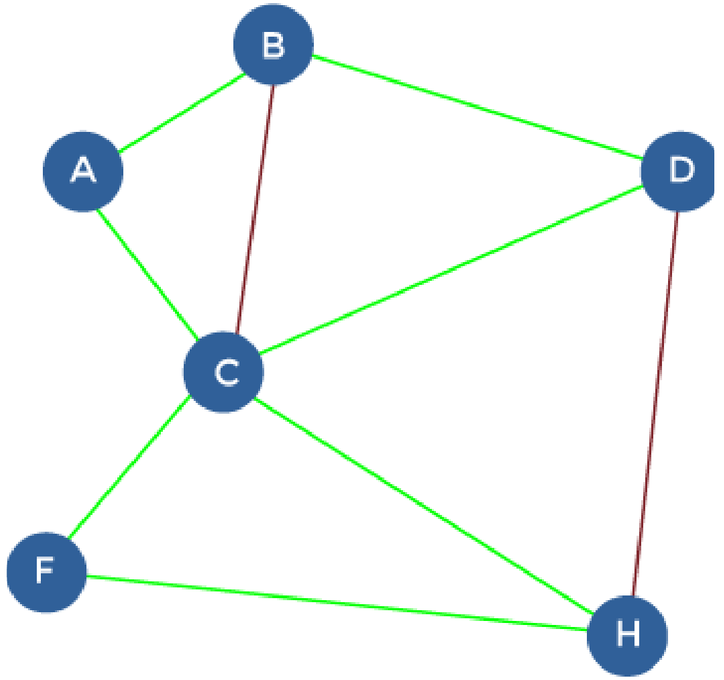
EXAMPLES:



PATHS

Vertex not repeated

Edge not repeated

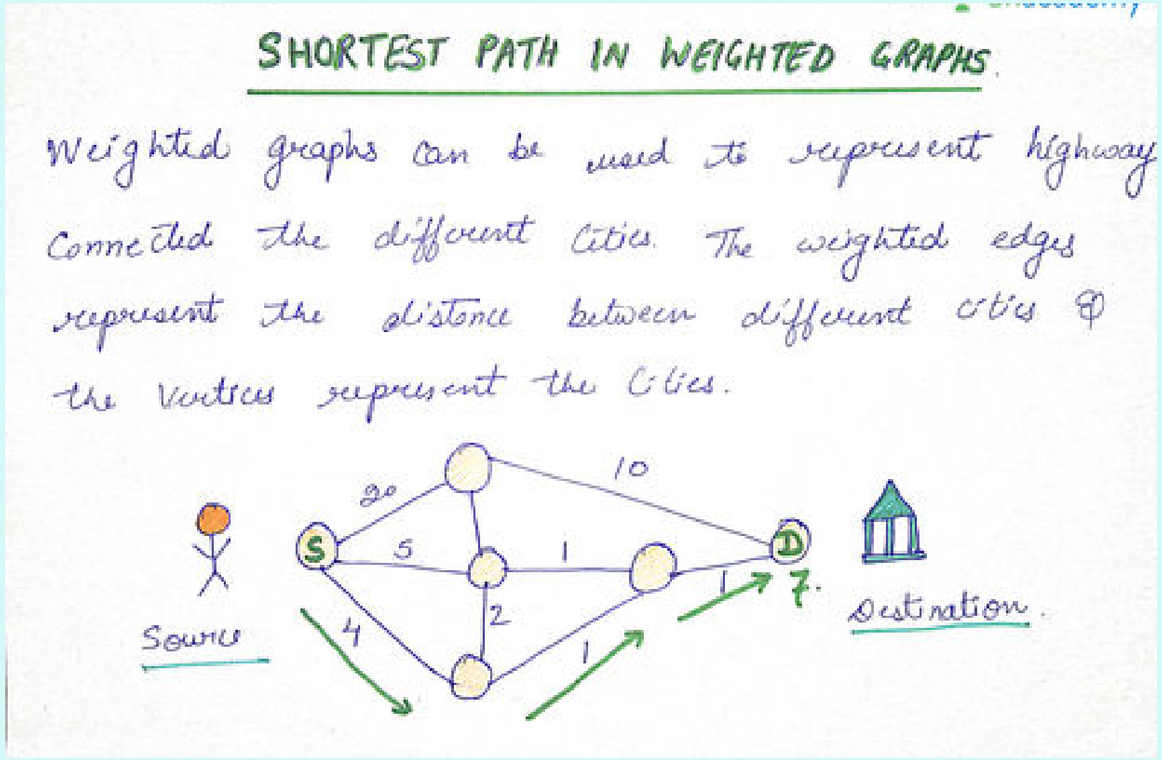


CIRCUITS

Edges cannot be repeated

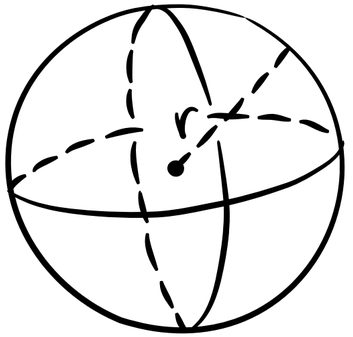
Vertex can be repeated

SHORTEST PATH IN WEIGHTED GRAPH



$$\frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

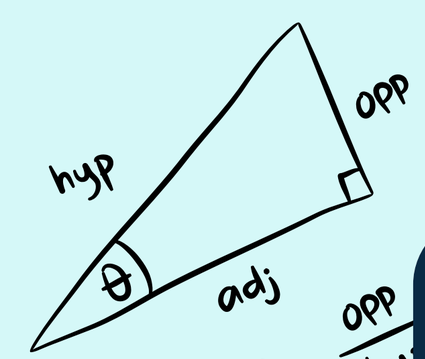
$$y = mx + b$$

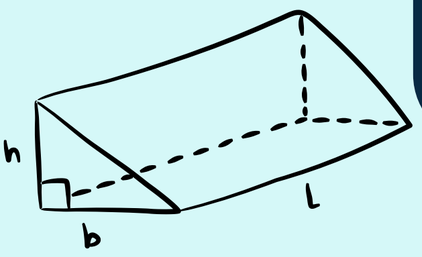


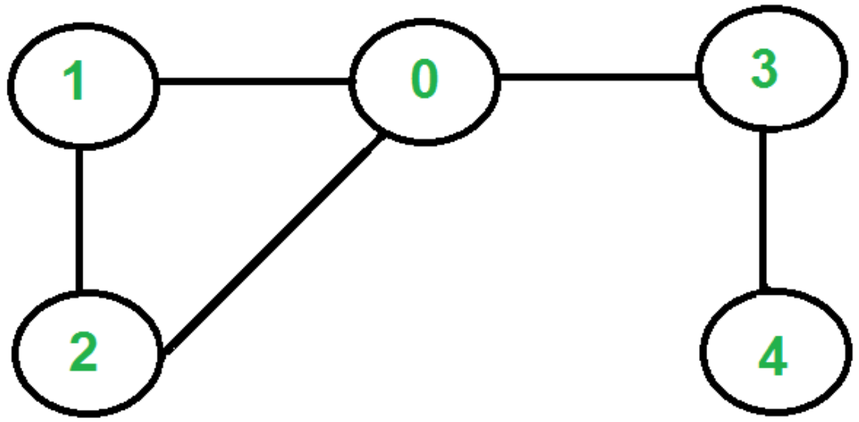
$$V = \frac{4}{3}\pi r^3$$

Eurlerian path and circuits

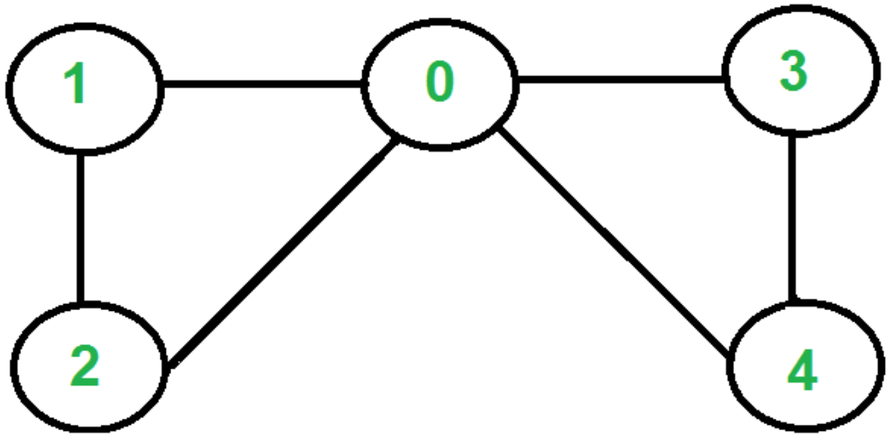
Eulerian Path is a path in a graph that visits every edge exactly once. Eulerian Circuit is an Eulerian Path that starts and ends on the same vertex.



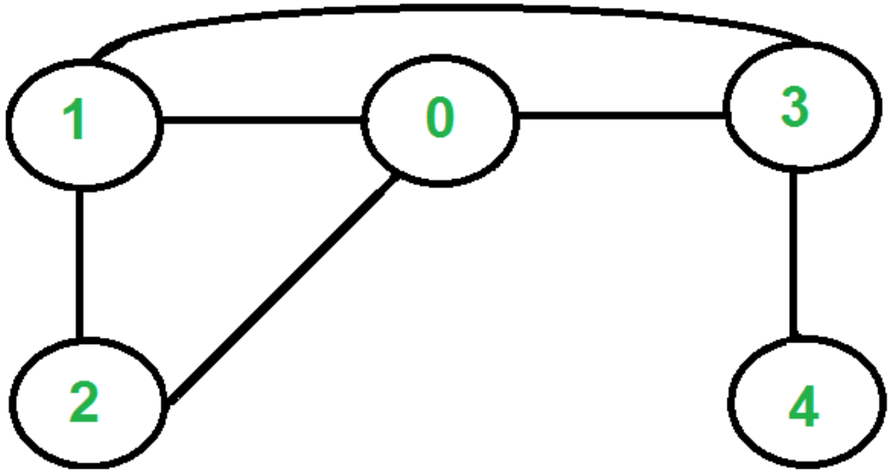




The graph has Eulerian Paths, for example "4 3 0 1 2 0", but no Eulerian Cycle. Note that there are two vertices with odd degree (4 and 0)



The graph has Eulerian Cycles, for example "2 1 0 3 4 0 2"
Note that all vertices have even degree



The graph is not Eulerian. Note that there are four vertices with odd degree (0, 1, 3 and 4)

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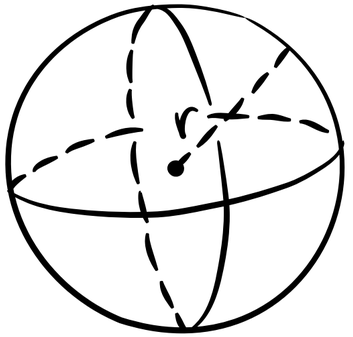

$$V = \frac{4}{3}\pi r^3$$

Thank you for