Graph Theory

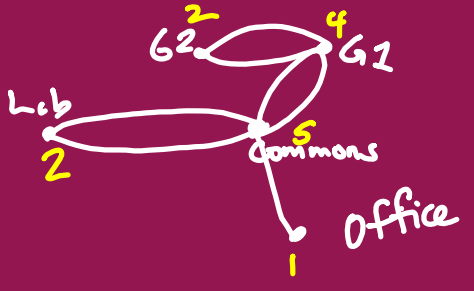
Vertex – Intersection pt.

Edge - Lines that connect vertices

Degree of a vertex = # of edges connected to the vertex

Parallel edges - connect the same 2 vertices

Edges can only cross at a vertex!



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Paths + Circuits

Euler Path

* cross every edge once
* different start + end

- only 2 odd vertices
- start/end @ odd vertices

Euler circuit

* cross every edge once
* Same start + end point

* all vertices must be even

Hamilton Path

* pass through every vertex once
* different start/end

Hamilton Circuit

* pass through every vertex once
* Same start + end point

Euler path
No

Euler circuit
yes

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

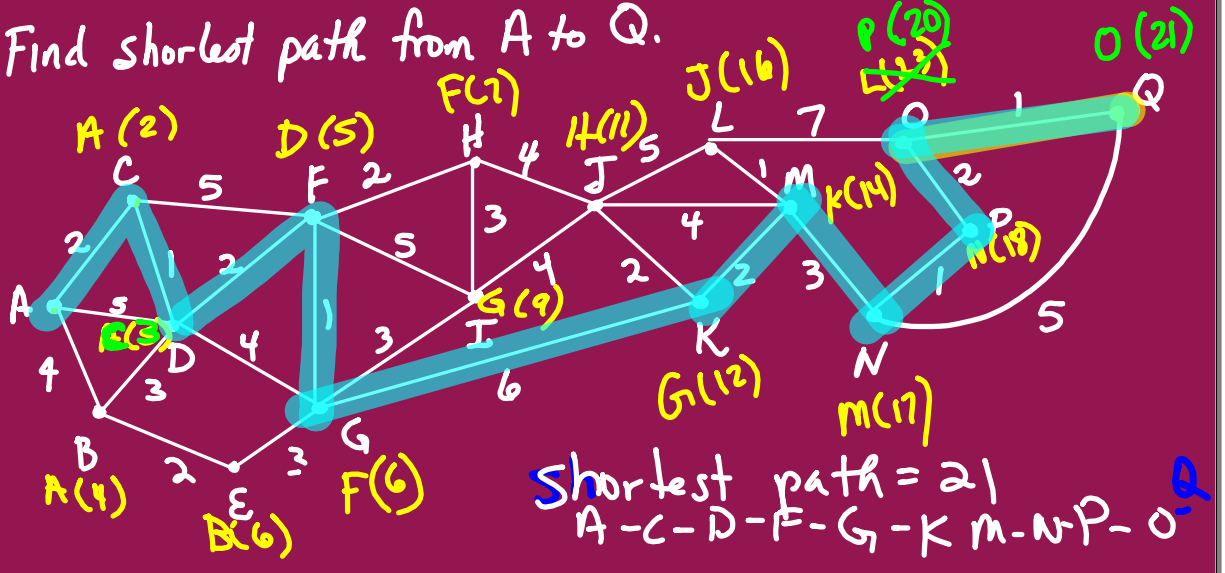
Ham path -
B-A-E-C-D

Ham. circuit
No

SHORTEST PATHS

* Weighted graph – edges have a numerical value
* Must use algorithm to find shortest path

Find shortest path from A to Q.



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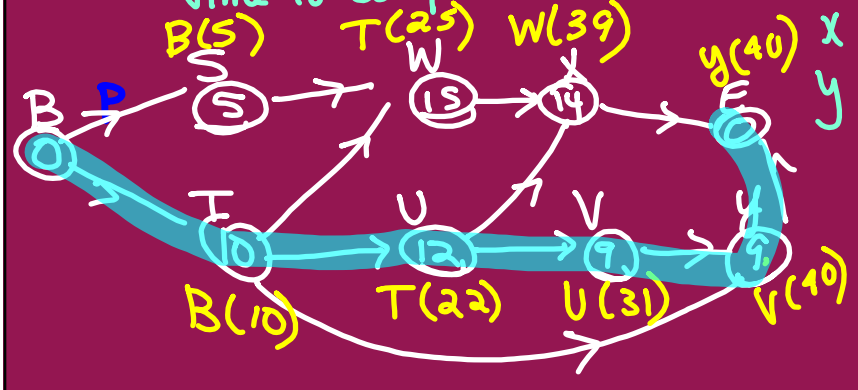
CRITICAL PATHS

* directed graph
* the longest path between 2 vertices
* try to find the minimum time to complete a task



Manufacturing a CD

Task	Time Required	Prerequisite Tasks
S	5 min	none
T	10	none
U	12	T
V	9	U
W	15	T, S
X	14	U, W
y	9	T, V

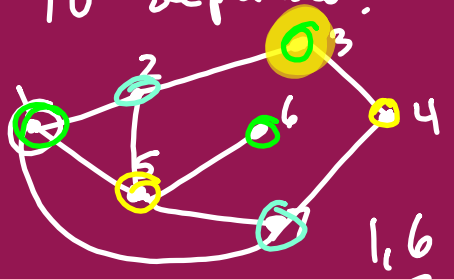
40 min. Critical path

Coloring Vertices

Key: Connect the vertices you are actually trying to separate!

Chemical	Cannot be stored with
1	2, 5, 7
2	1, 3, 5
3	2, 4
4	3, 7
5	1, 2, 6, 7
6	5
7	1, 4, 5

Draw graph - Connect the vertices you want to separate!



1, 6
2, 7
3, 4, 5