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Graph Theory

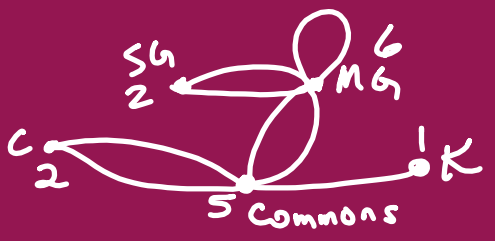
Vertex – Intersection pt.

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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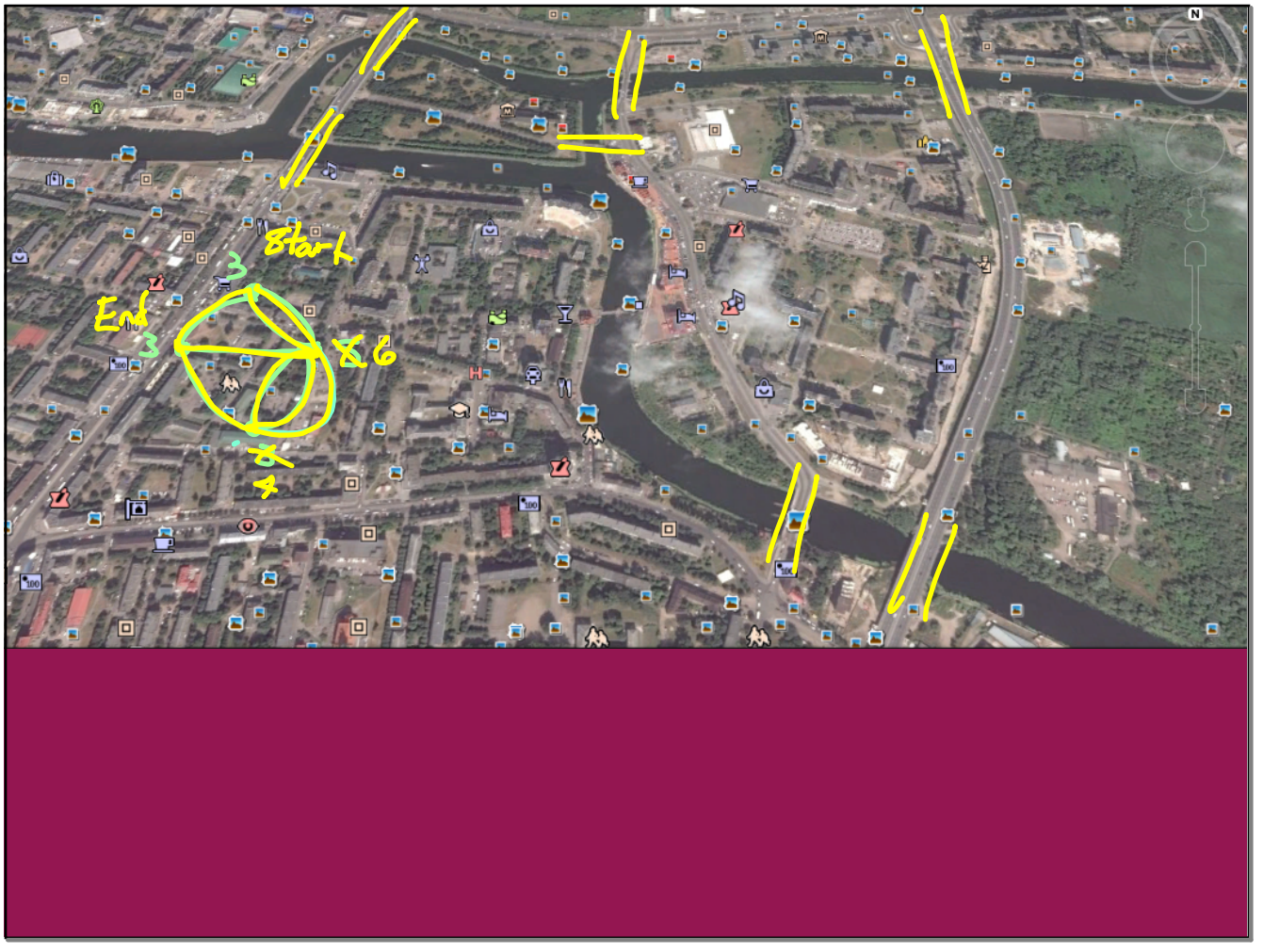


Paths & Circuits

Euler Path

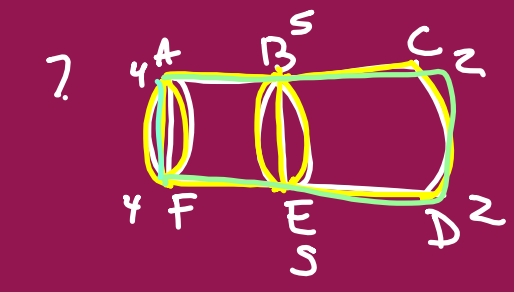
* cross every edge once
* different start & end

- must start & end on odd degree vertices
- all other vertices are even

Euler circuit

* cross every edge once
* Same start & end point

- Must have all even Vertices



Euler path - yes

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

-F-A-F-A-B

Euler circuit - No - not all even degrees

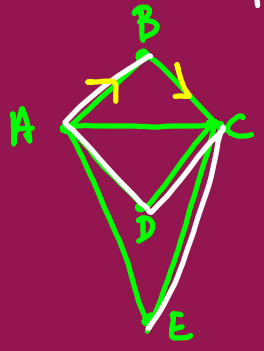
Hamilton Path

* pass through every vertex once
* different start/end
* find with trial & error

Hamilton Circuit

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

find with trial & error



Hamilton path -

A-B-C-D-E-F

Hamilton circuit

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

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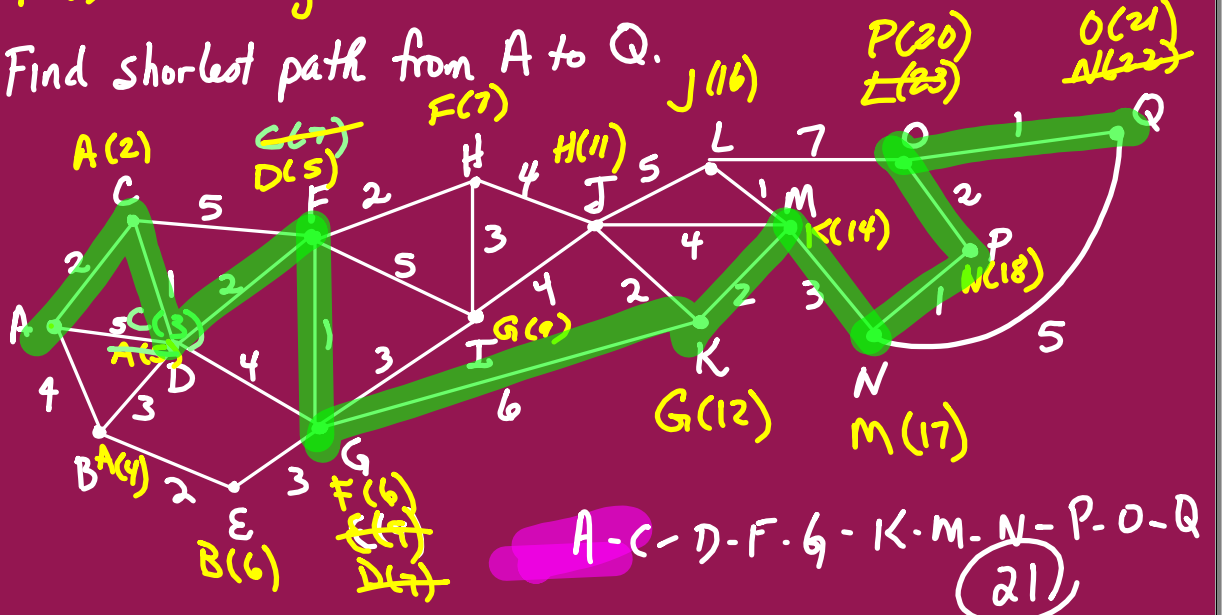
SHORTEST PATHS

* 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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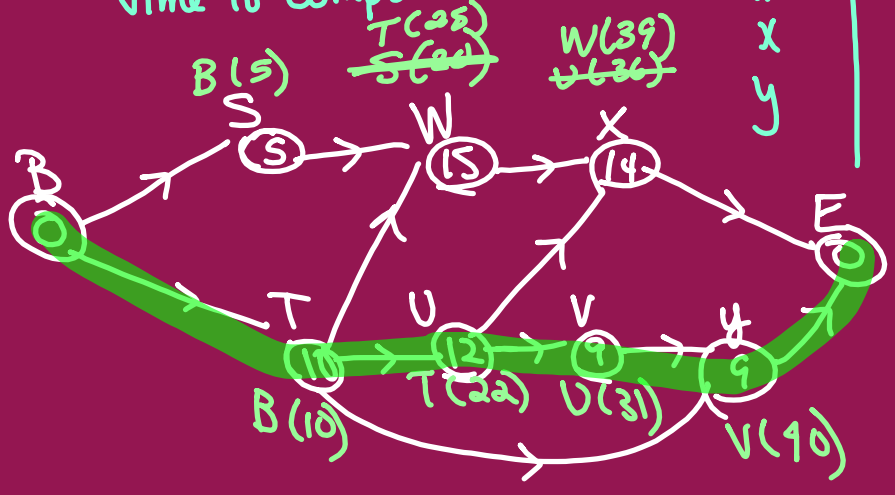
CRITICAL PATHS

* 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

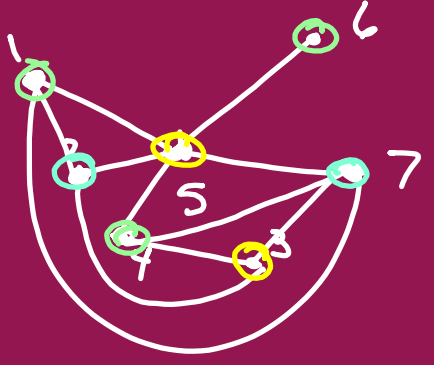


y(40)
40 min
B-T-U-V-y-E

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



Cab 1: 3, 5
Cab 2: 1, 4, 6
Cab 3: 2, 7

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