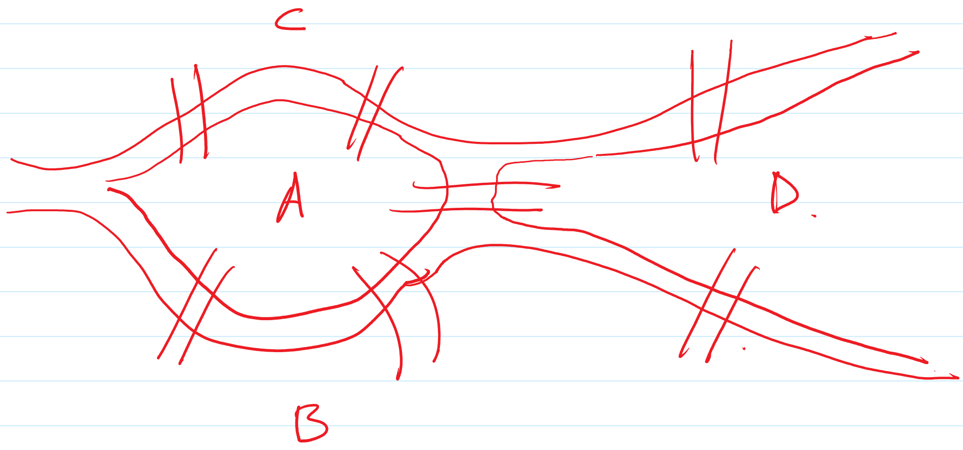
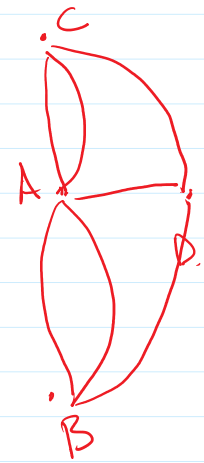
# Lecture 26:- EULER PATH & EULER CIRCUIT.

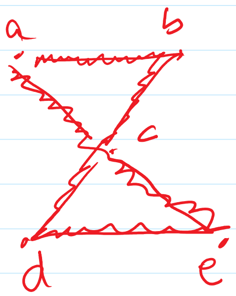
1736



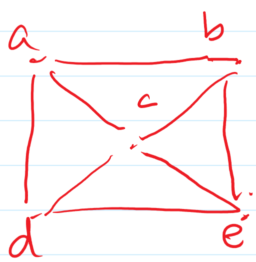




EULER. CIRCUIT :- 1) Simple Circuit [ Start & End the same. / No edge Repeated.
2) It traverses all the edges.

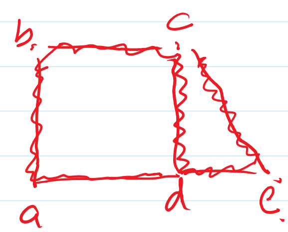
EULER PATH :- 1) A Simple path.
2) It traverses all edges.




EULER Circuit.
→ EULER path




¬ Euler Circuit
¬ Euler path.

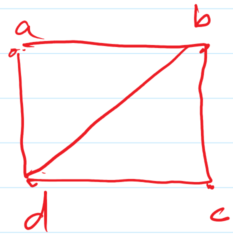



{ ¬ Euler Circuit ?
✓ Euler path }

EULER CIRCUIT → EULER PATH.

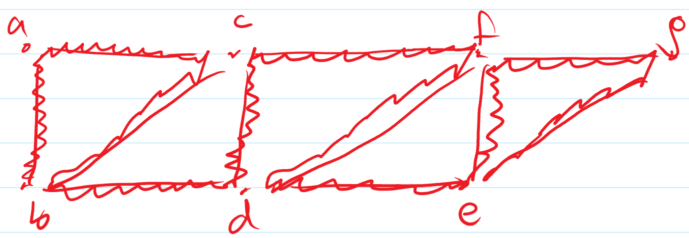
Theorem :- A Connected ✓1 multigraph ✓2 with atleast two ✓3 Vertices has EULER CIRCUIT iff & only if each of its Vertices has even degree.

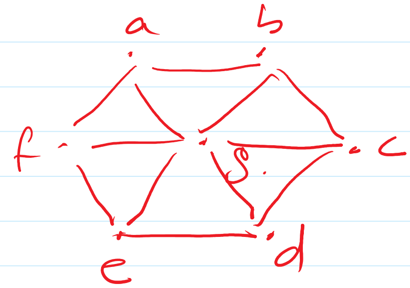

deg (a) = 2 ✓



deg (a) = 2 ✓
deg (b) = 3 ✗
deg (c) = 2 ✓
deg (d) = 3 ✗.

Theorem 2 :- A Connected multigraph has a EULER path but no EULER Circuit iff it has exactly two Vertices of odd degree.

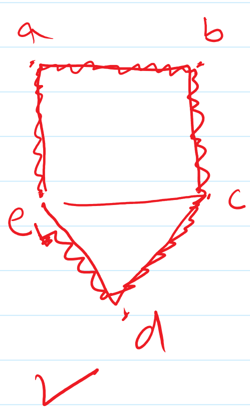




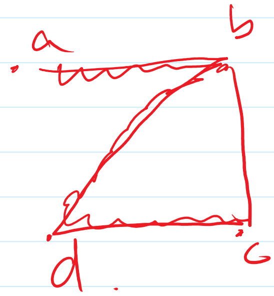
HAMILTON Circuits and PATHS.

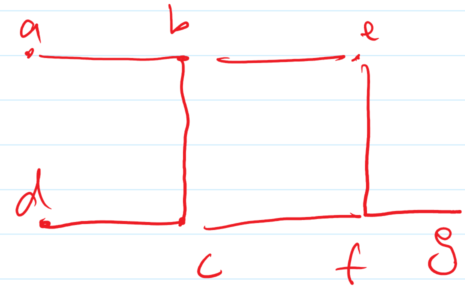
H- Circuit 1. Simple Circuit
2. Traverse all the Vertices.

H - path 1- Simple path
2- Traverse all the Vertices.



HAMILTON Circuit → HAMILTON PATH. ✓.

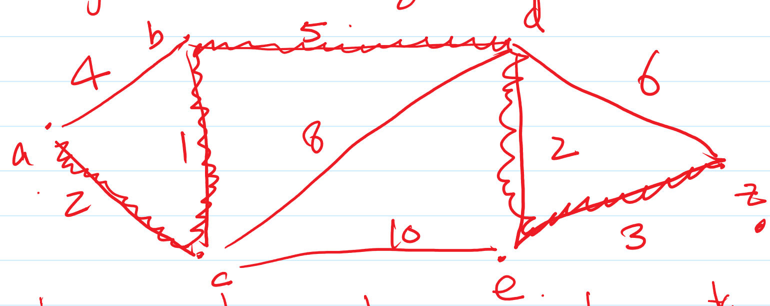




× No Hamilton Circuit.
path ✓.

Hamilton Circuit and path ×.

Dijistra Algorithm.

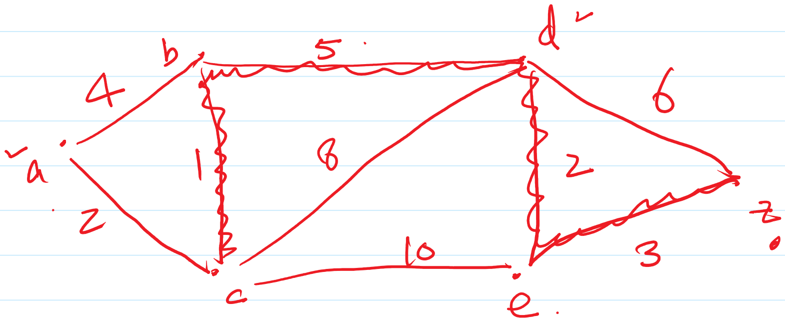



a to z.

| | a | b | c | d | e | z |
|---|---|---|---|---|---|---|
| a | $\boxed{0}$ | 4a | $\boxed{2a}$ | ∞ | ∞ | ∞ |
| c | $\boxed{0}$ | $\boxed{3c}$ | $\boxed{2a}$ | 10c | 12c | ∞. |
| b | $\boxed{0}$ | $\boxed{3c}$ | $\boxed{2a}$ | $\boxed{8b}$ | 12c | ∞. |
| d | $\boxed{0}$ | $\boxed{3c}$ | $\boxed{2a}$ | $\boxed{8b}$ | $\boxed{10d}$ | 14d. |
| e | $\boxed{0}$ | $\boxed{3c}$ | $\boxed{2a}$ | $\boxed{8b}$ | $\boxed{10d}$ | $\boxed{13e}$ |
| z | $\boxed{0}$ | $\boxed{3c}$ | $\boxed{2a}$ | $\boxed{8b}$ | $\boxed{10d}$ | $\boxed{13e}$ |

acbdez

13.




$\boxed{\text{c to z}}$

| | a | b | c | d | e | z |
|---|---|---|---|---|---|---|
| c | 2c | $\boxed{1c}$ | $\boxed{0}$ | 8c | 10c | ∞. |
| b | $\boxed{2c}$ | $\boxed{1c}$ | $\boxed{0}$ | 6b | 10c | ∞. |
| a | $\boxed{2c}$ | $\boxed{1c}$ | $\boxed{0}$ | $\boxed{6b}$ | 10c | ∞. |
| d | $\boxed{2c}$ | $\boxed{1c}$ | $\boxed{0}$ | $\boxed{6b}$ | $\boxed{8d}$ | 12d. |

$\boxed{\text{cbdez}}$

11.

| | | | | | | |
|---|---|---|---|---|---|---|
| d | $\boxed{2c}$ | $\boxed{1c}$ | $\boxed{0}$ | $\boxed{6b}$ | $\boxed{8d}$ | 12d. |
| e | u | u | u | u | u | $\boxed{11e}$. |
| z | u | u | u | u | u | u. |