# CS 315 GRAPH TRAVERSALS

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THE FOLLOWING ADJACENCY LIST IS DEFINED ON VERTICES $\{A, B, C, D, E, F\}$

$A \rightarrow [C, E, F]$

$B \rightarrow [C, D, E]$

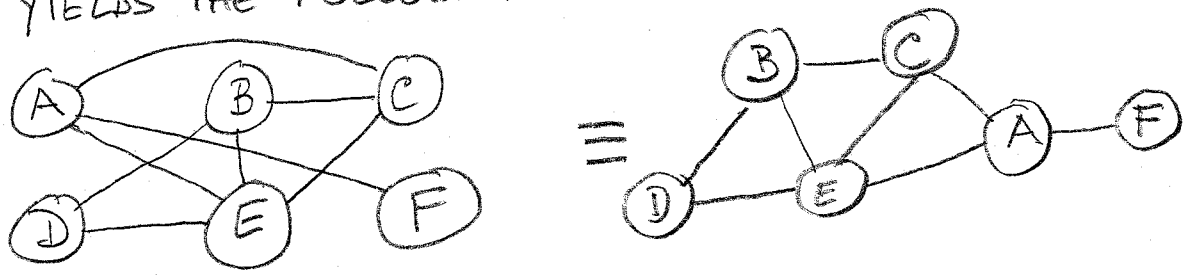
$C \rightarrow [A, B, E]$

$D \rightarrow [B, E]$

$E \rightarrow [A, B, C, D]$

$F \rightarrow [A]$

IT YIELDS THE FOLLOWING GRAPH:




BREADTH-FIRST TRAVERSAL:

WE WILL KEEP TRACK OF THE QUEUE, THE VISITED LIST OF VERTICES, AND THE VISITED LIST OF EDGES STARTING FROM VERTEX F. ADJACENT VERTICES WILL BE VISITED IN ALPHABETICAL ORDER.

(1) QUEUE: F
VISITED: F
EDGE LIST:

(2) QUEUE: ~~F~~, A
VISITED: F, A
EDGE LIST: F↦A

11/30/2018

(3) QUEUE: ~~F~~, ~~A~~, C, E

VISITED: F, A, C, E

EDGE LIST: F↔A, A↔C, A↔E

(4) QUEUE: ~~F~~, ~~A~~, ~~C~~, E, B

VISITED: F, A, C, E, B

EDGE LIST: F↔A, A↔C, ~~A~~↔E, C↔B

(5) QUEUE: ~~F~~, ~~A~~, ~~C~~, ~~E~~, B, D

VISITED: F, A, C, E, B, D

EDGE LIST: F↔A, A↔C, A↔E, C↔B, E↔D

(6) QUEUE: ~~F~~, ~~A~~, ~~C~~, ~~E~~, ~~B~~, D

VISITED: F, A, C, E, B, D

EDGE LIST: ~~F↔A~~, A↔C, A↔E, C↔B, E↔D

[NOTE: B CAN'T BRING IN ANY VERTEX BECAUSE THEY HAVE ALL BEEN VISITED.]

(7) QUEUE: ~~F~~, ~~A~~, ~~C~~, ~~E~~, ~~B~~, ~~D~~

VISITED: F, A, C, E, B, D

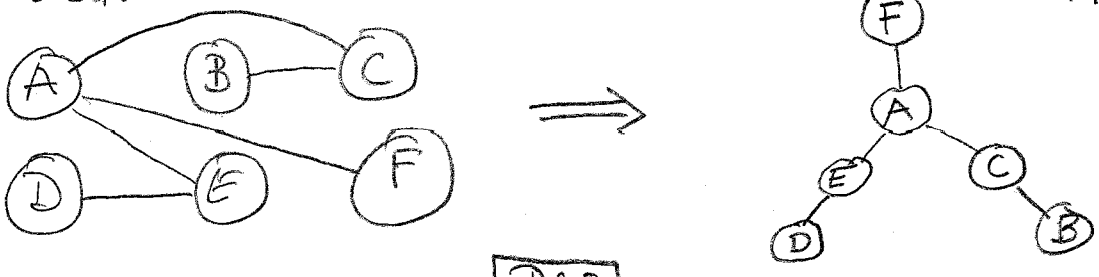
EDGE LIST: F↔A, A↔C, A↔E, C↔B, E↔D

[SAME AS ABOVE]

QUEUE IS EMPTY SO STOP.

THE VISITED LIST HAS THE SEQUENCE OF VERTICES IN THE ORDER VISITED.

THE EDGE LIST CONSTRUCTS A SPANNING TREE [CONNECTED, NO CYCLES]

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DEPTH-FIRST TRAVERSAL:

IN THIS TRAVERSAL WE REPLACE THE QUEUE WITH A STACK. WE WILL START AT B. AGAIN, ADJACENT VERTICES WILL BE VISITED IN ALPHABETICAL ORDER.

(1)

B
stack

VISITED: B
EDGE LIST:

(2)

C
B
stack

VISITED: B, C
EDGE LIST: B↔C

(3)

A
C
B
stack

VISITED: B, C, A
EDGE LIST: B↔C, C↔A

(4)

E
A
C
B
stack

VISITED: B, C, A, E
EDGE LIST: B↔C, C↔A, A↔E

(5)

D
E
A
C
B
stack

VISITED: B, C, A, E, D
EDGE LIST: B↔C, C↔A, A↔E, E↔D

(6) D ~~HAS~~ NOWHERE UNVISITED TO ADD SO POP D.

E
A
C
B
stack

VISITED: B, C, A, E, D
EDGE LIST: B↔C, C↔A, A↔E, E↔D

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11/30/2018

(7) E HAS NOWHERE UNVISITED TO ADD SO POP E.

A
C
B
Stack

VISITED: B, C, A, E, D
EDGE LIST: B↔C, C↔A, A↔E, E↔D

(8) A can add F so PUSH F

F
A
C
B
Stack

VISITED: B, C, A, E, D, F
EDGE LIST: B↔C, C↔A, A↔E, E↔D, A↔F

(9) F HAS NO ONE TO ADD SO POP F.

A
C
B
Stack

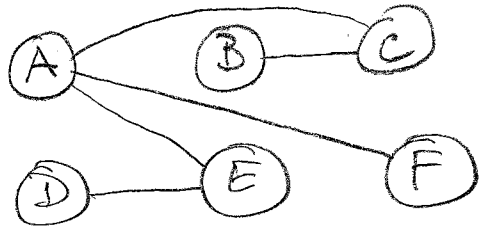
VISITED: B, C, A, E, D, F
EDGE LIST: B↔C, C↔A, A↔E, E↔D, A↔F

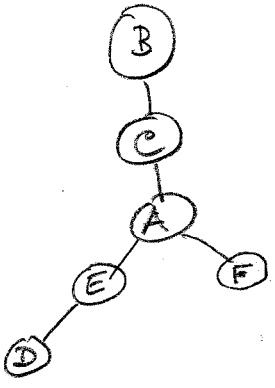
(10), (11), (12) ALL VERTICES HAVE BEEN VISITED SO STACK IS POPPED UNTIL EMPTY.

Stack

VISITED: B, C, A, E, D, F
EDGE LIST: B↔C, C↔A, A↔E, E↔D, A↔F

THE VISITED LIST HAS THE SEQUENCE OF VERTICES.
THE SPANNING TREE RESULTING FROM THE EDGE LIST IS:

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