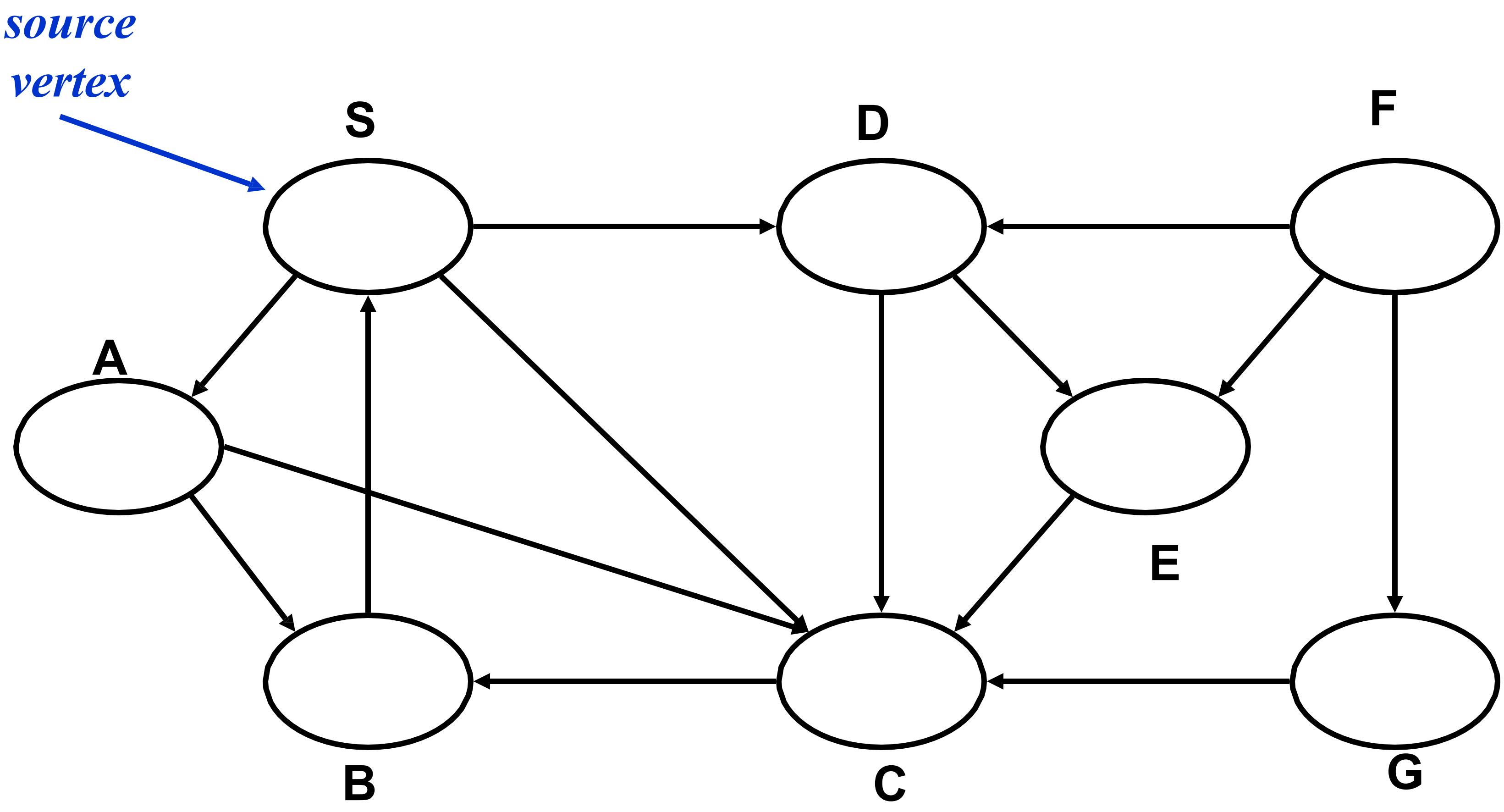
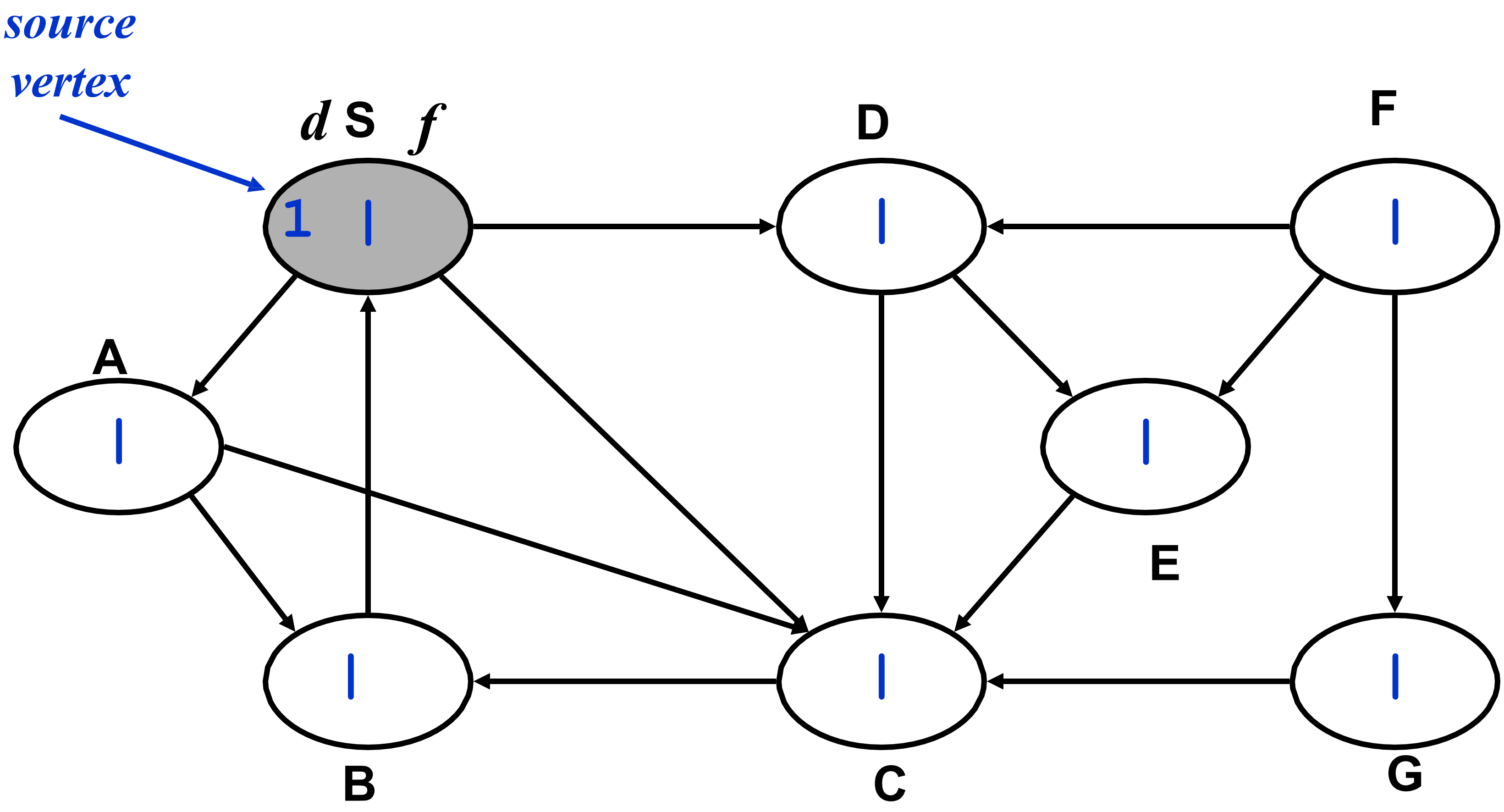
DFS

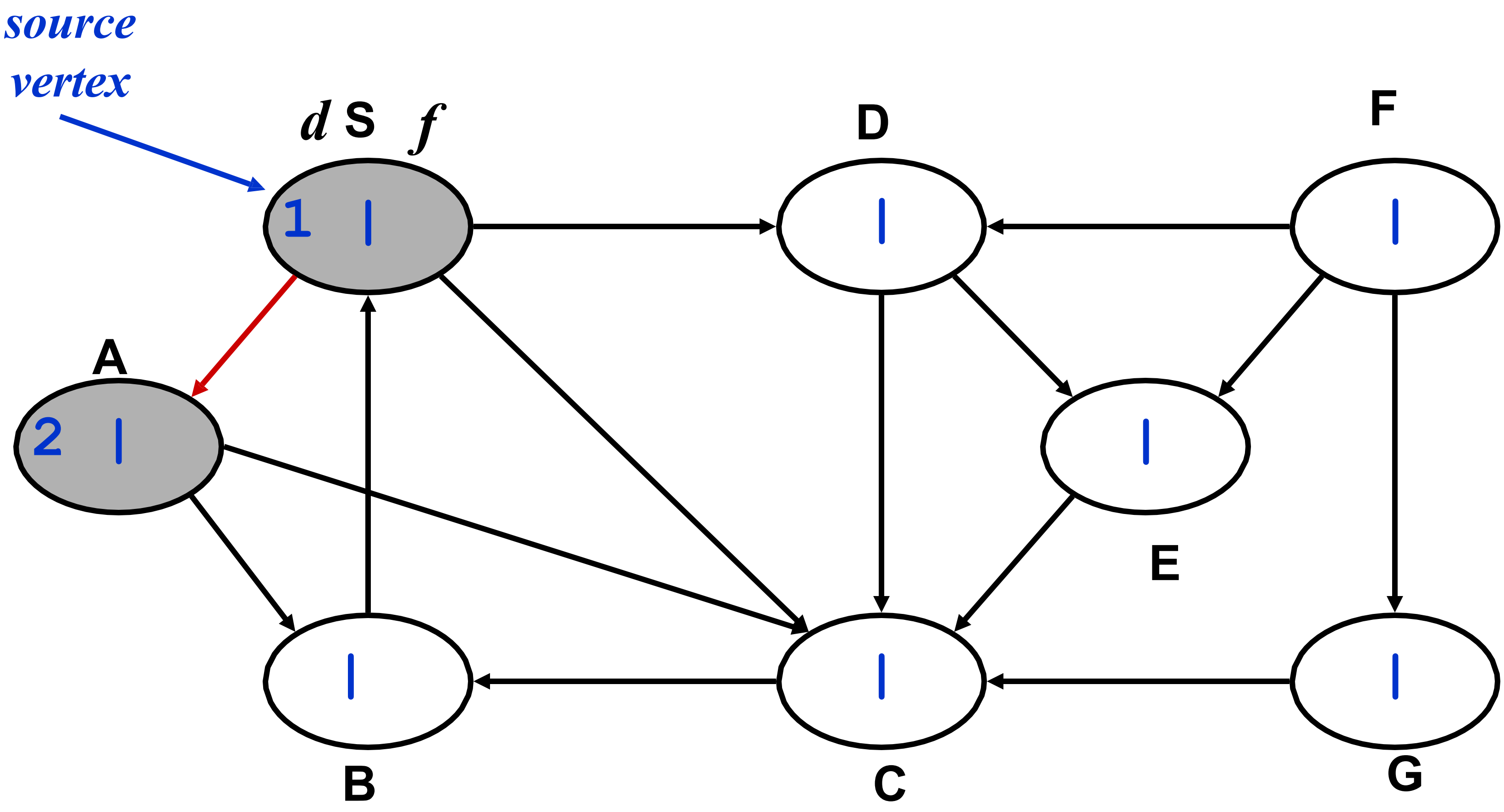
DFS Example



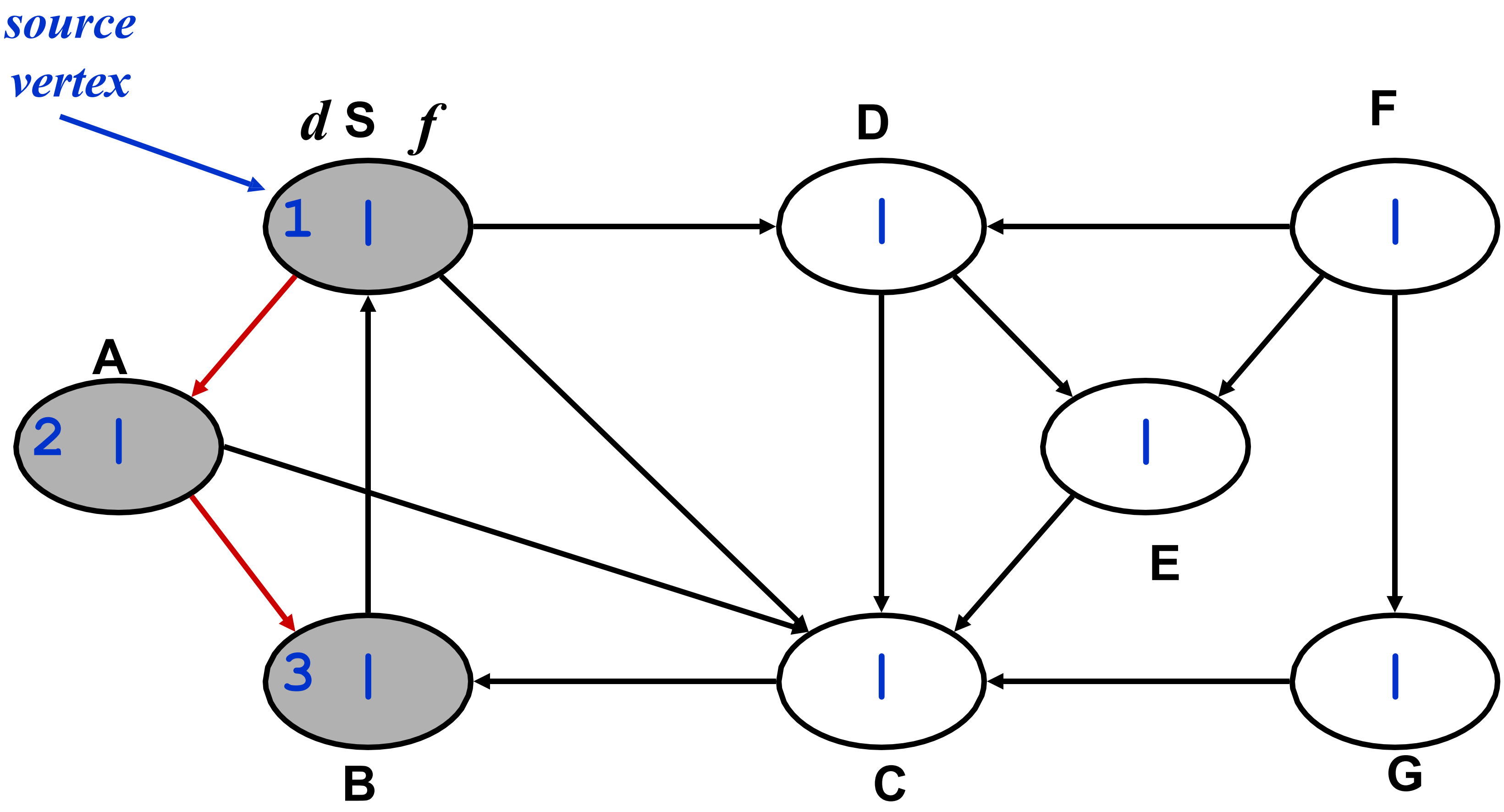
DFS Example



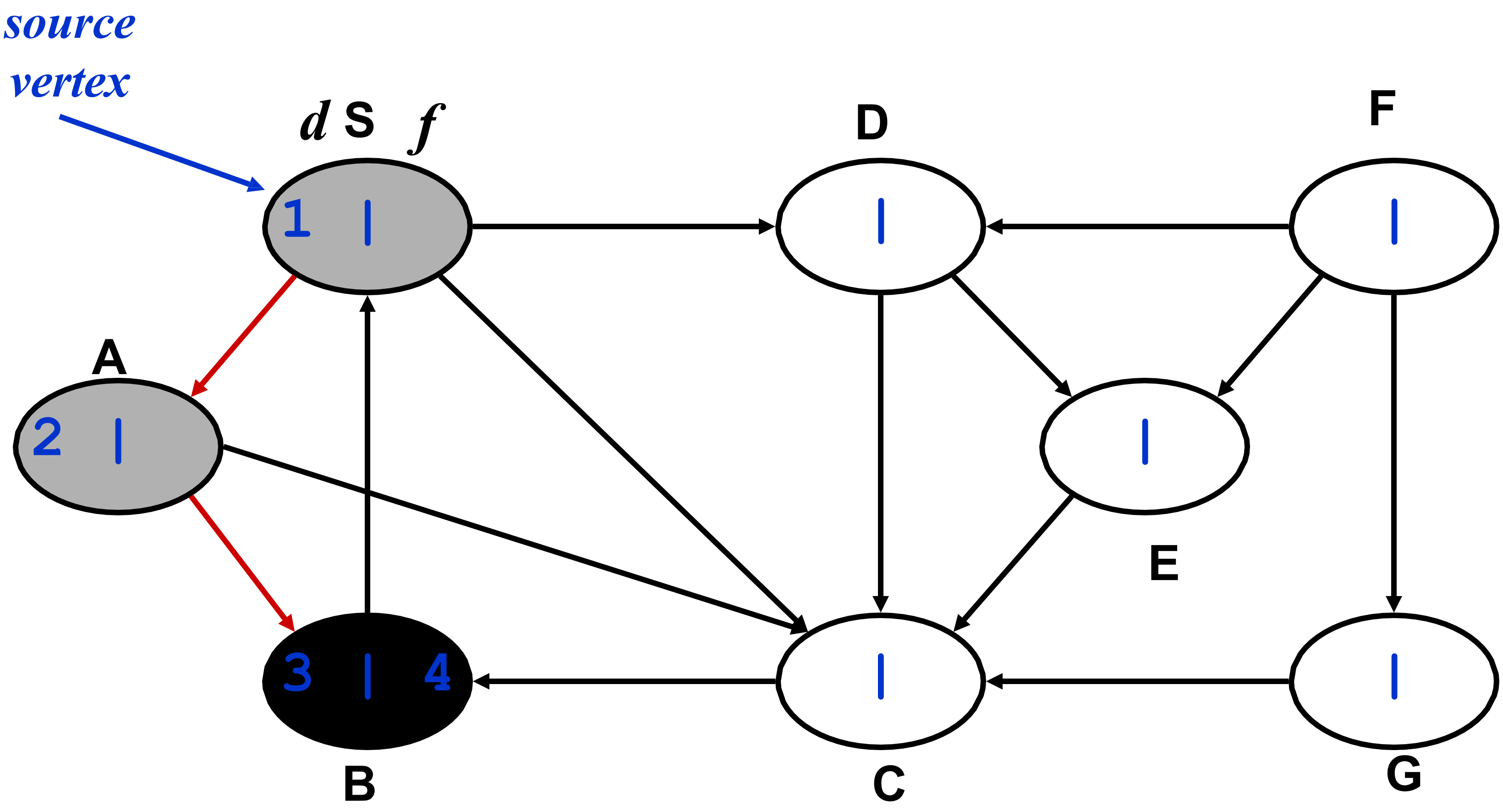
DFS Example



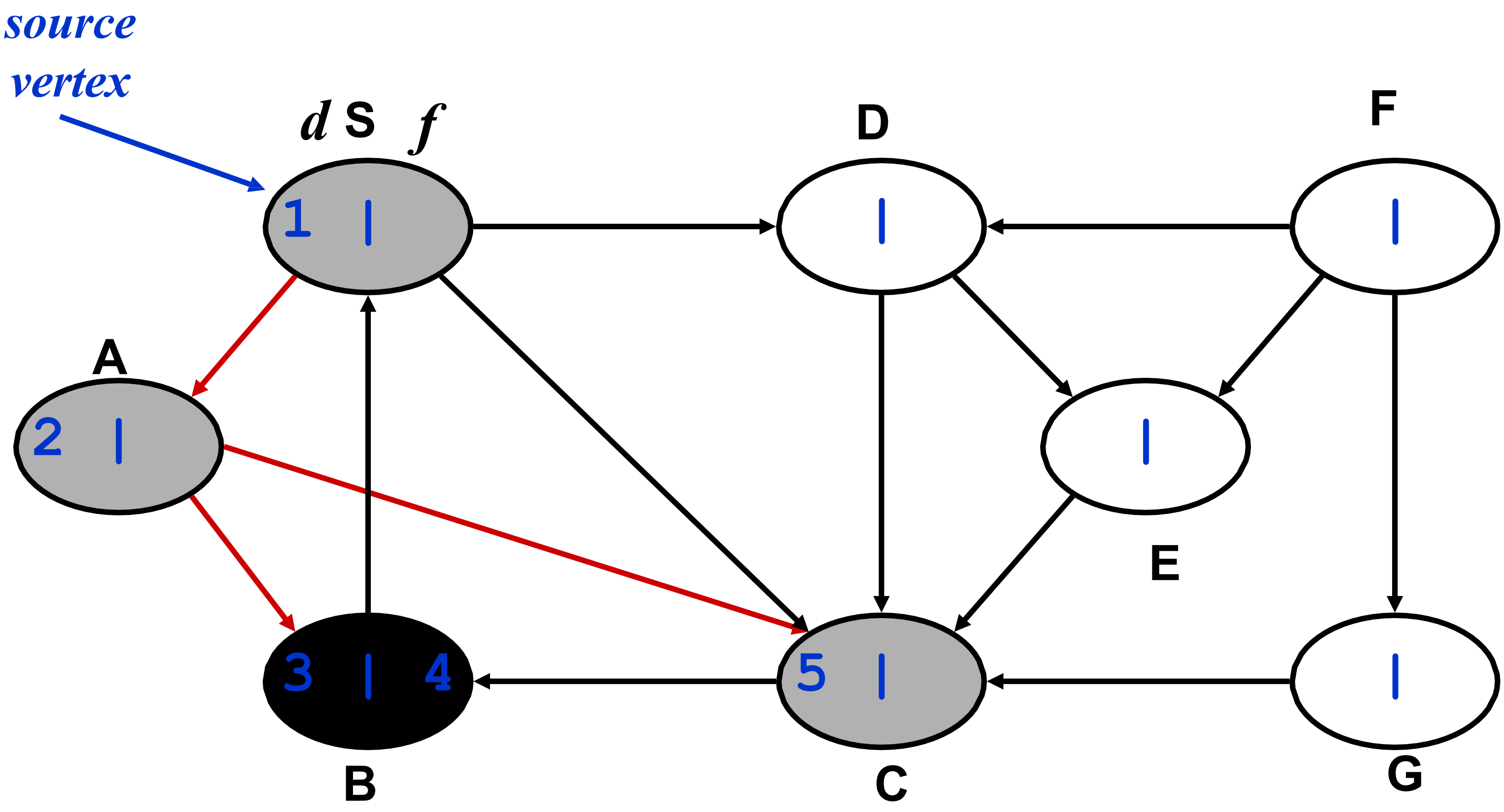
DFS Example



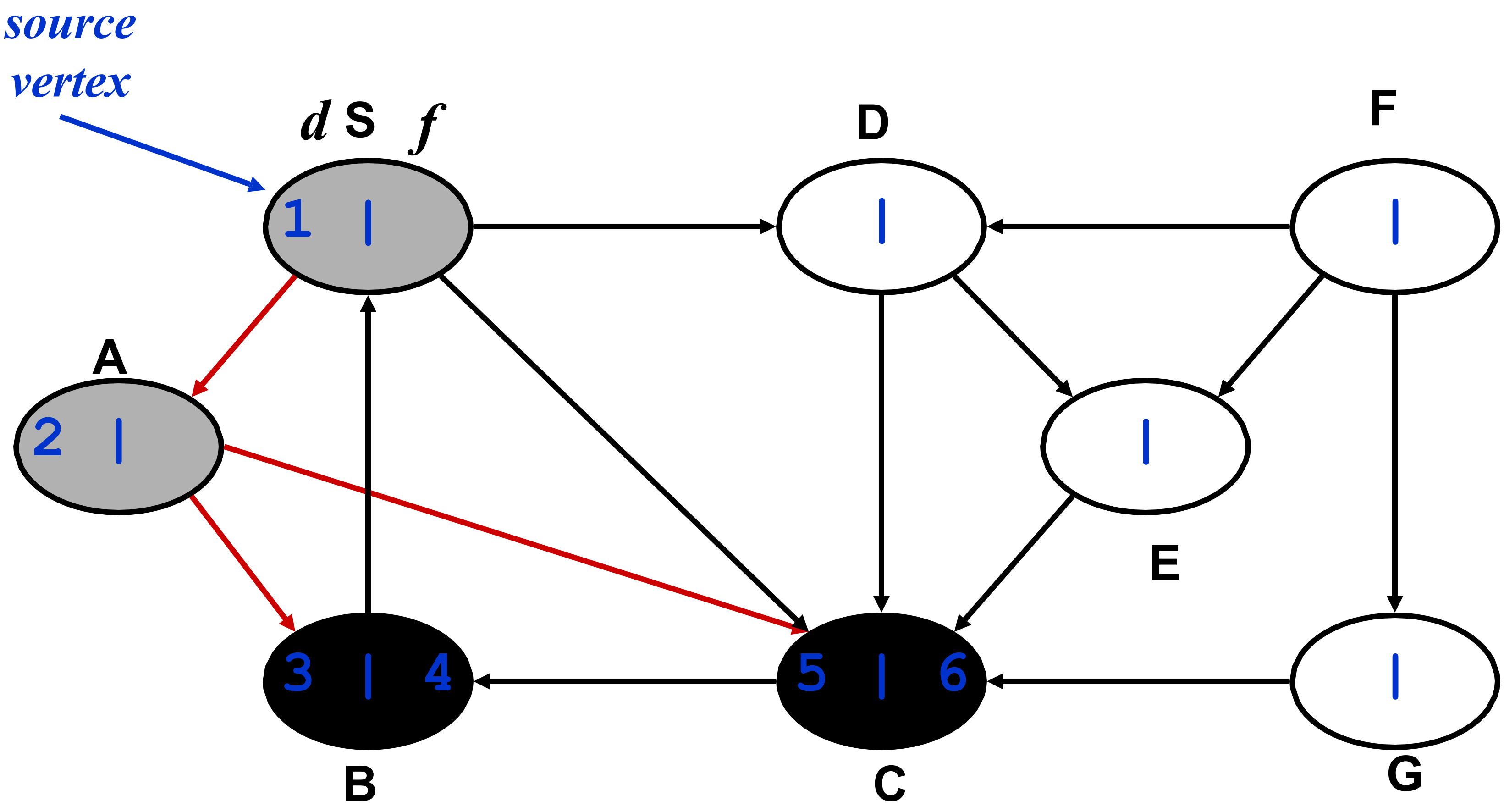
DFS Example



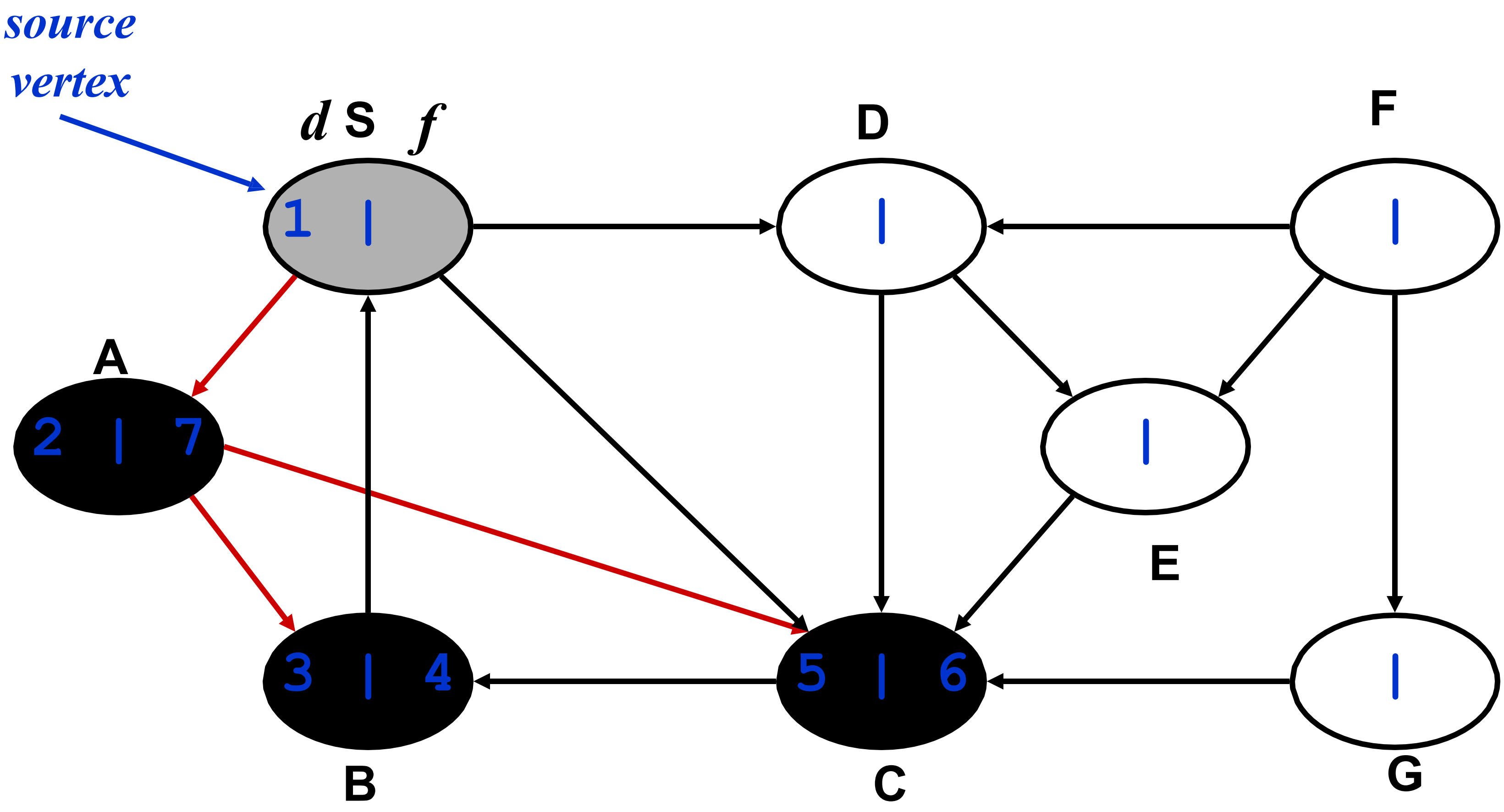
DFS Example



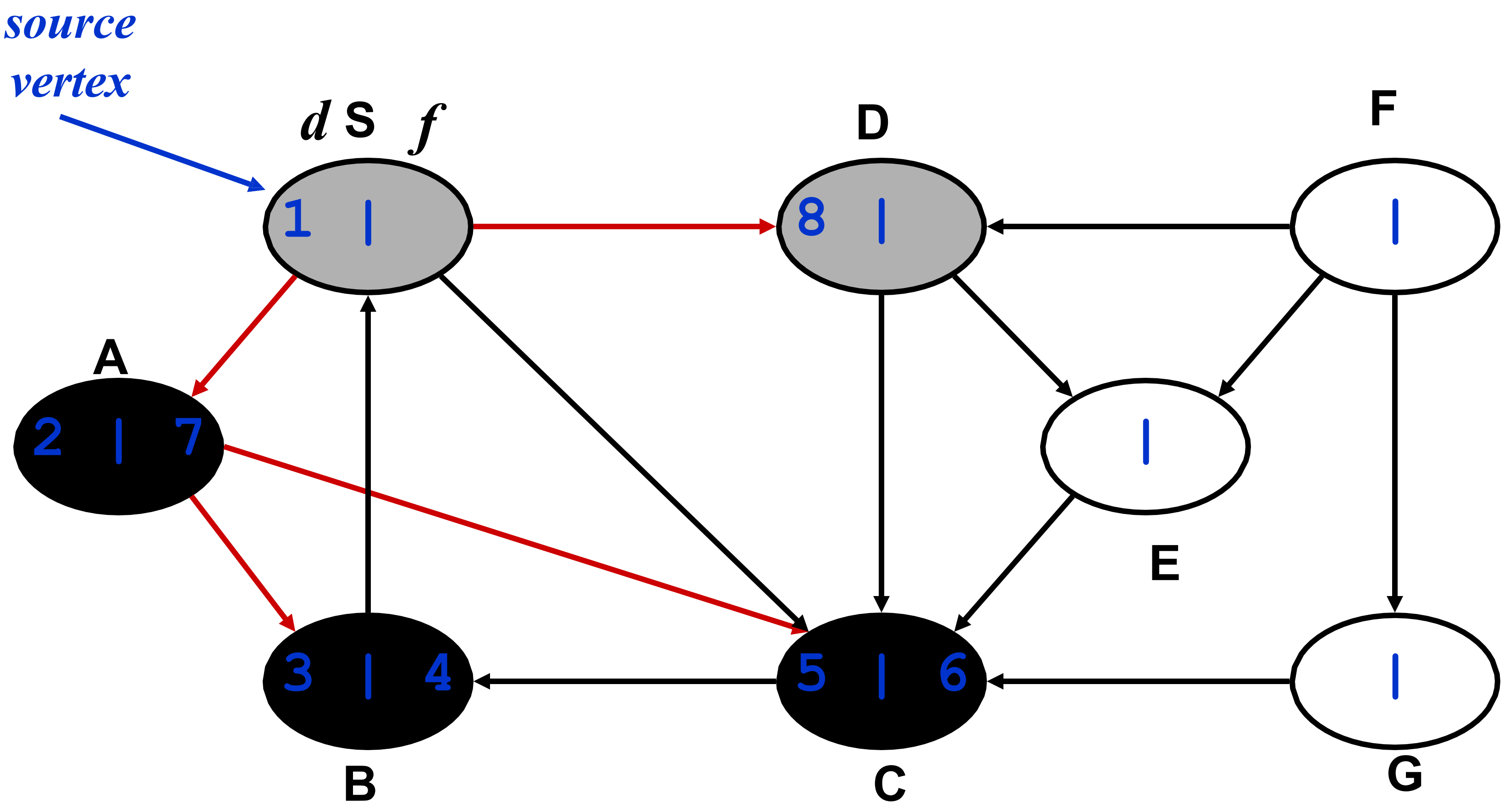
DFS Example



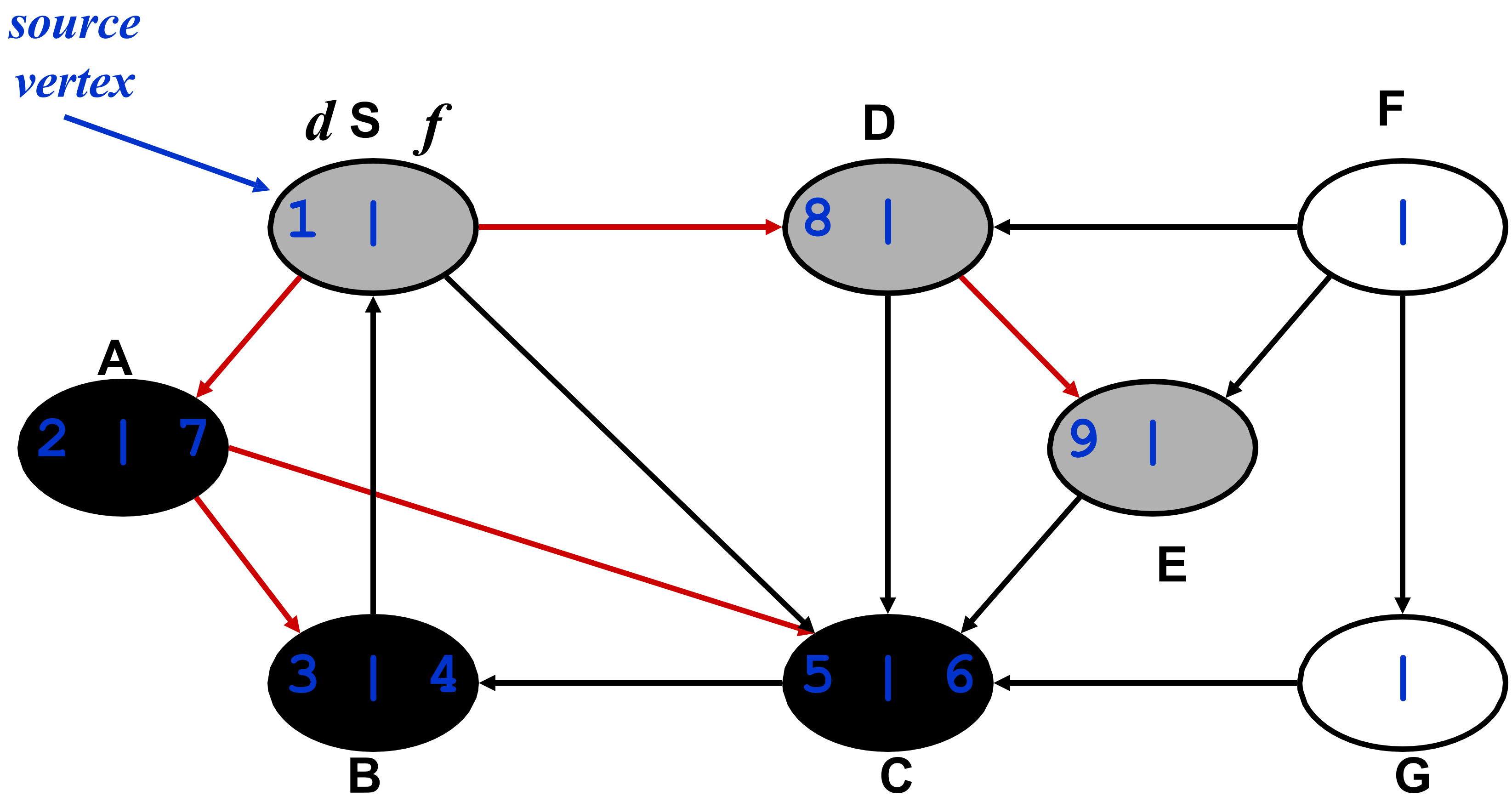
DFS Example



DFS Example



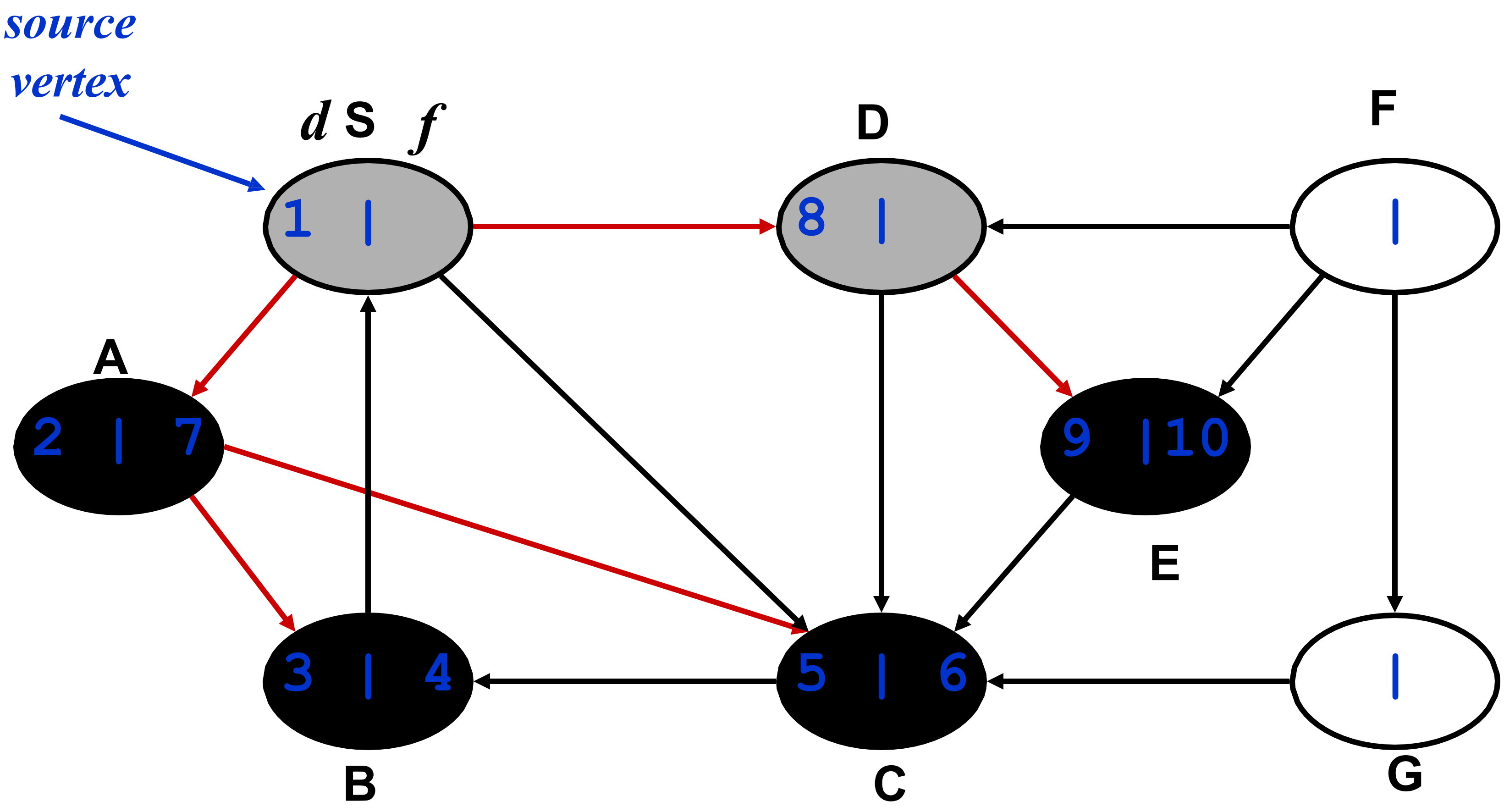
DFS Example



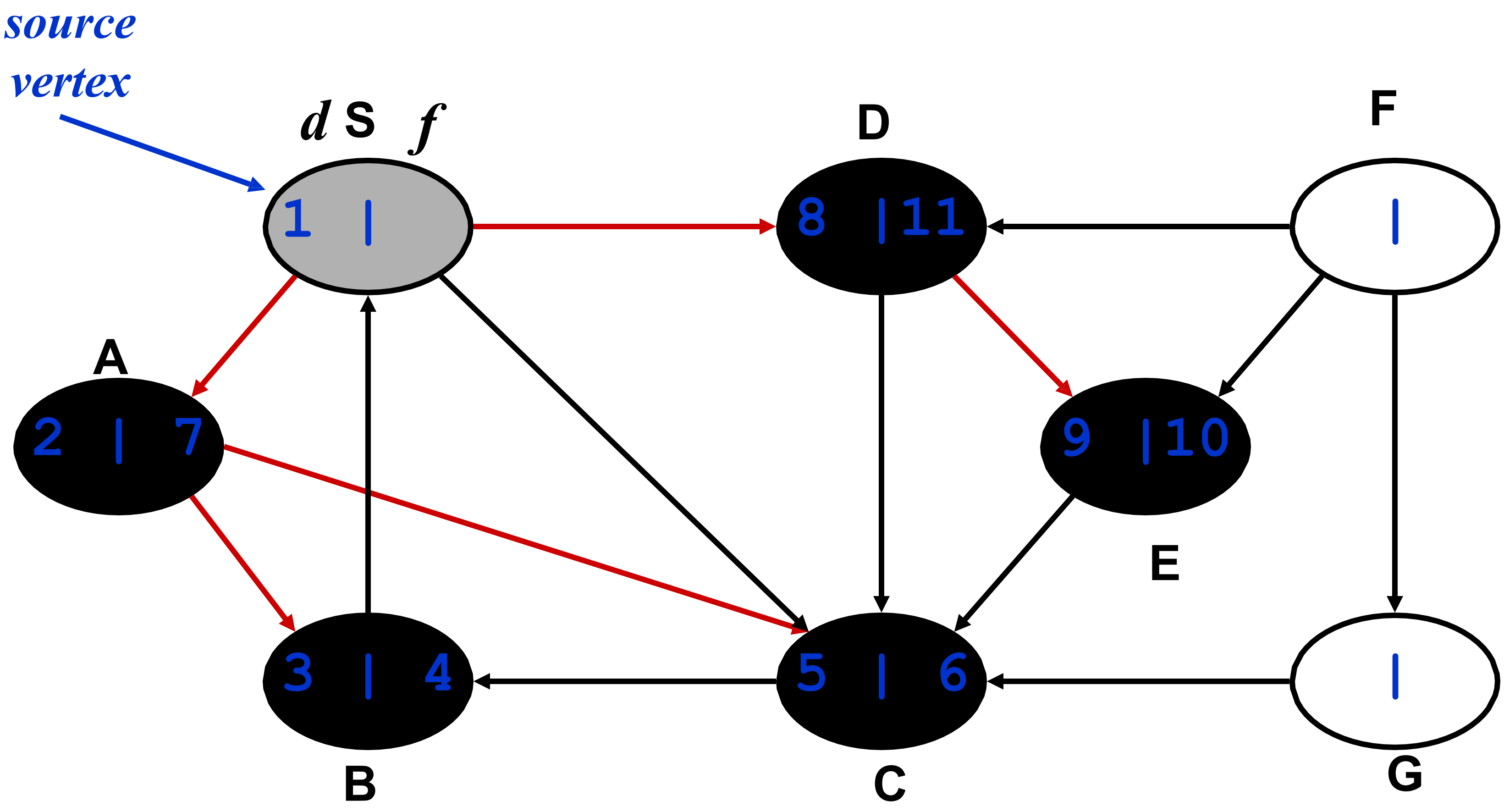
What is the structure of the grey vertices?

What do they represent?

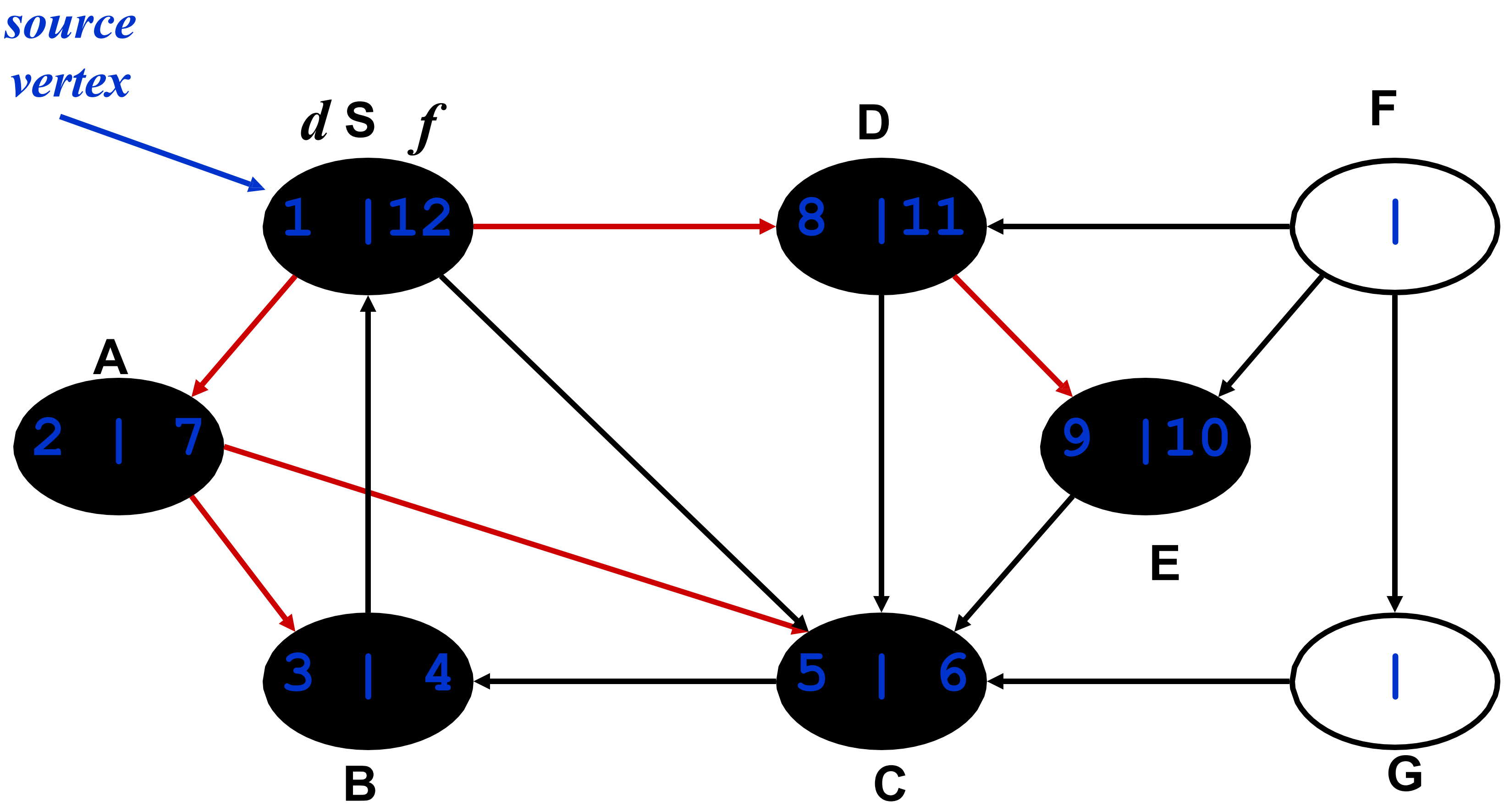
DFS Example



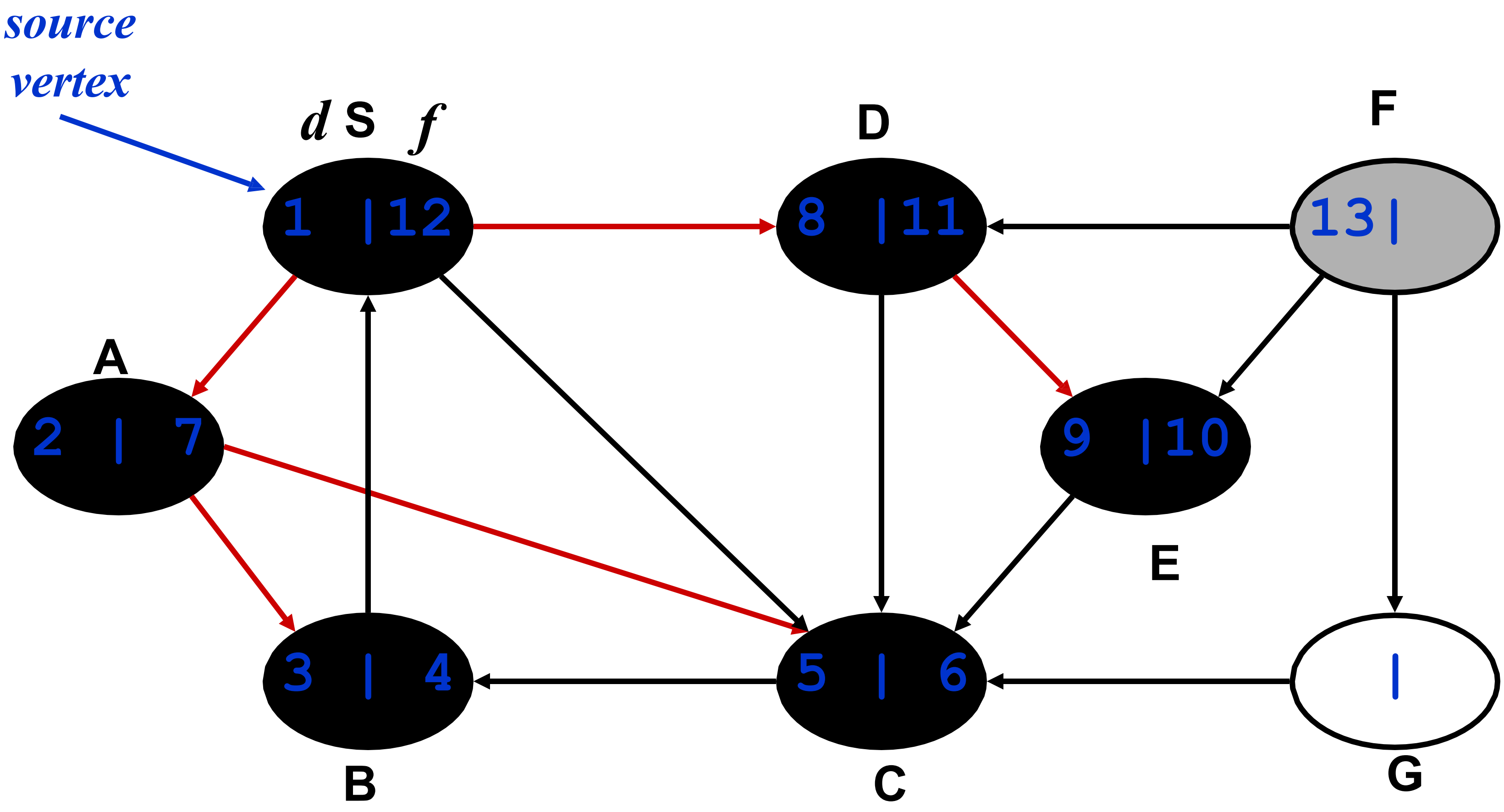
DFS Example



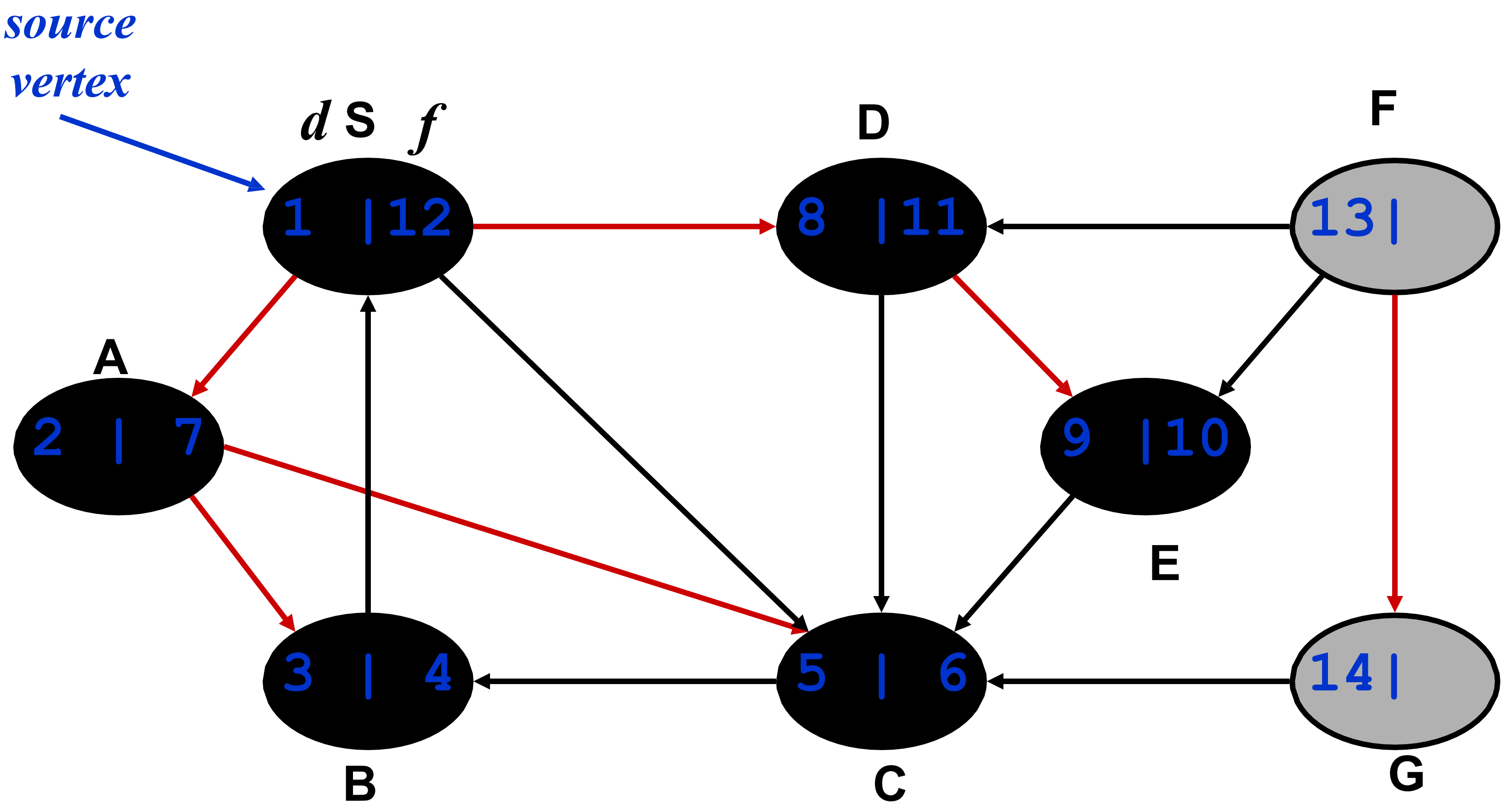
DFS Example



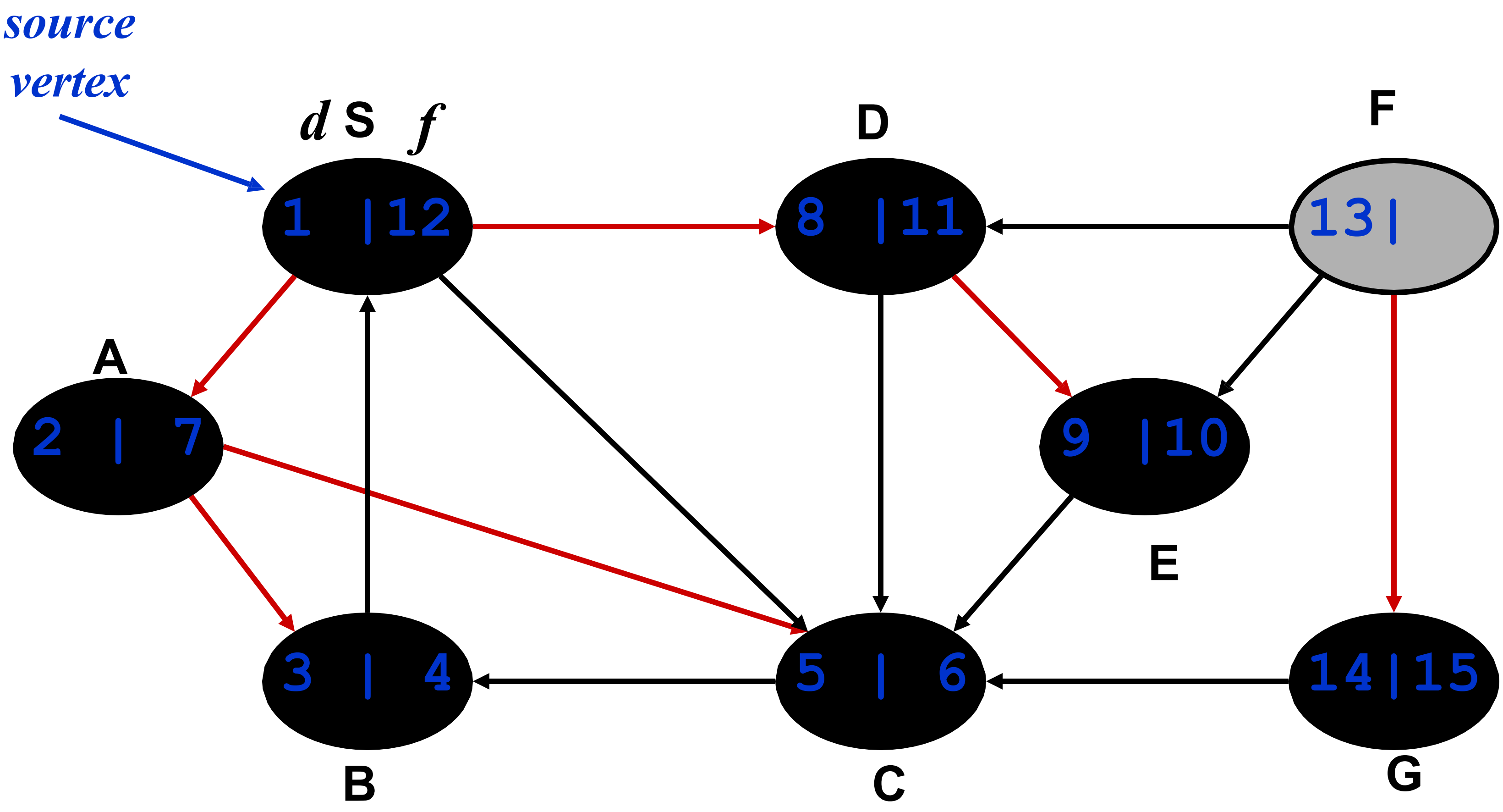
DFS Example



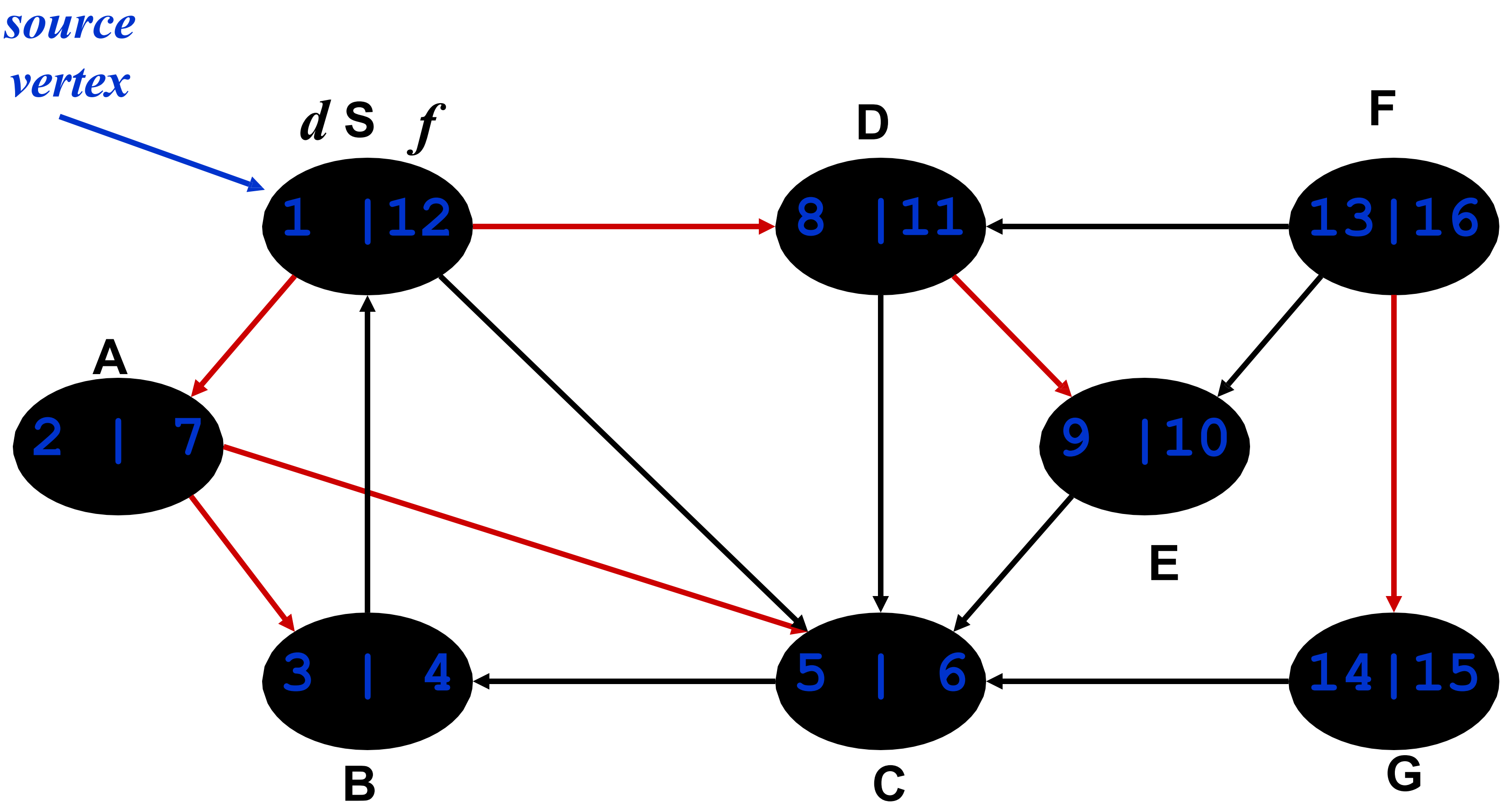
DFS Example



DFS Example

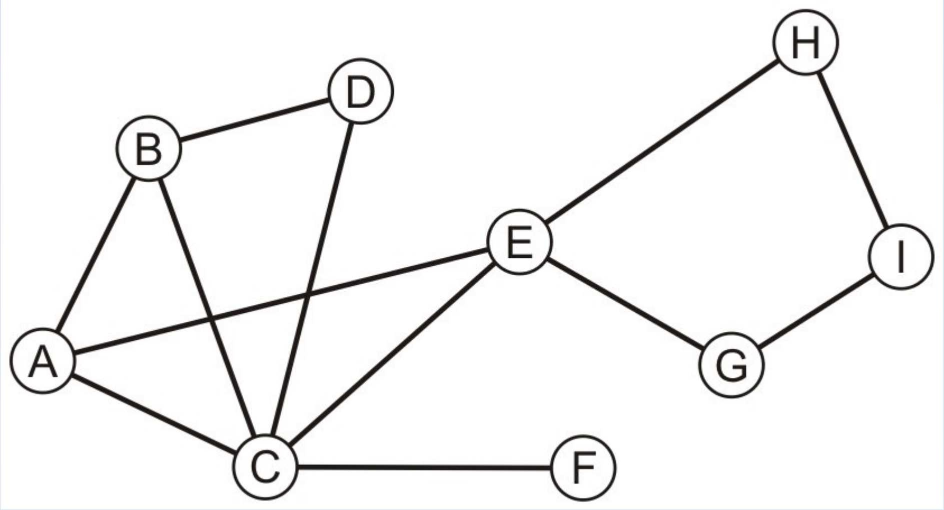


DFS Example



Example

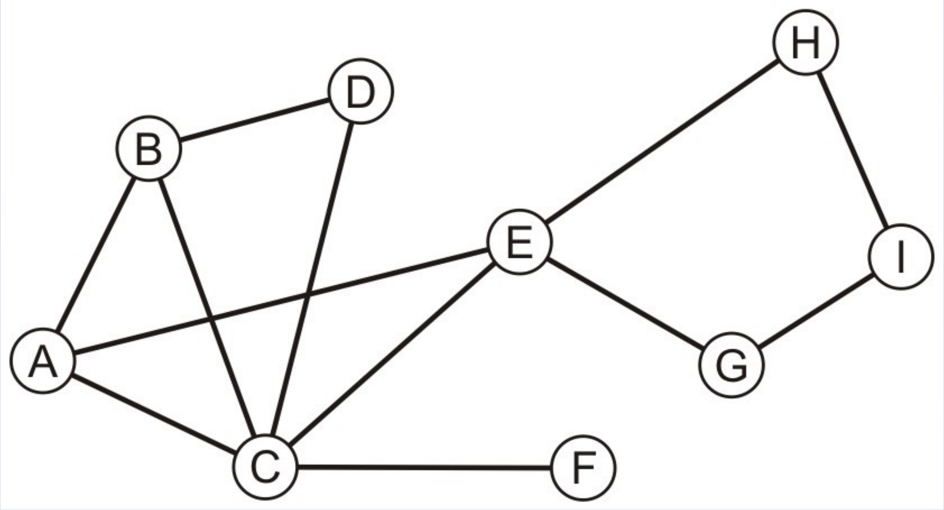
Consider this graph



Example

Performing a breadth-first traversal

- Push the first vertex onto the queue



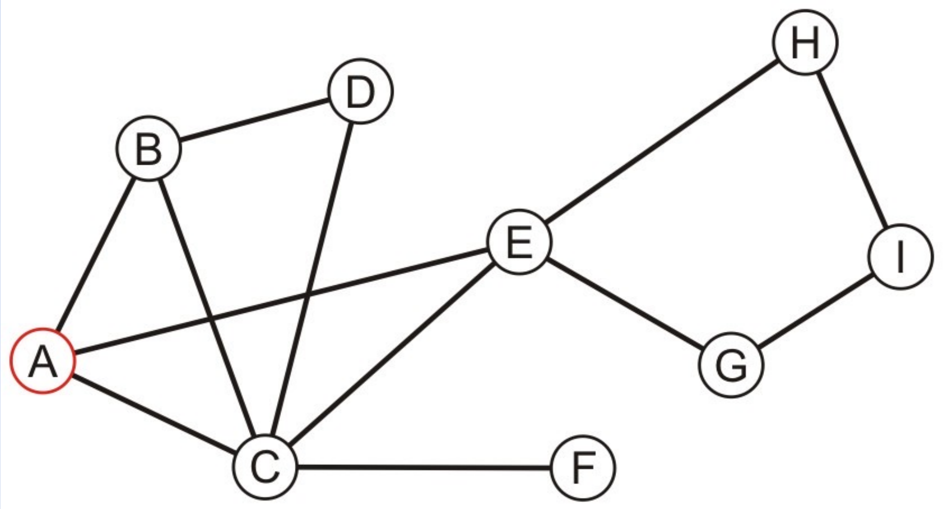
A					

Example

Performing a breadth-first traversal

– Pop A and push B, C and E

A



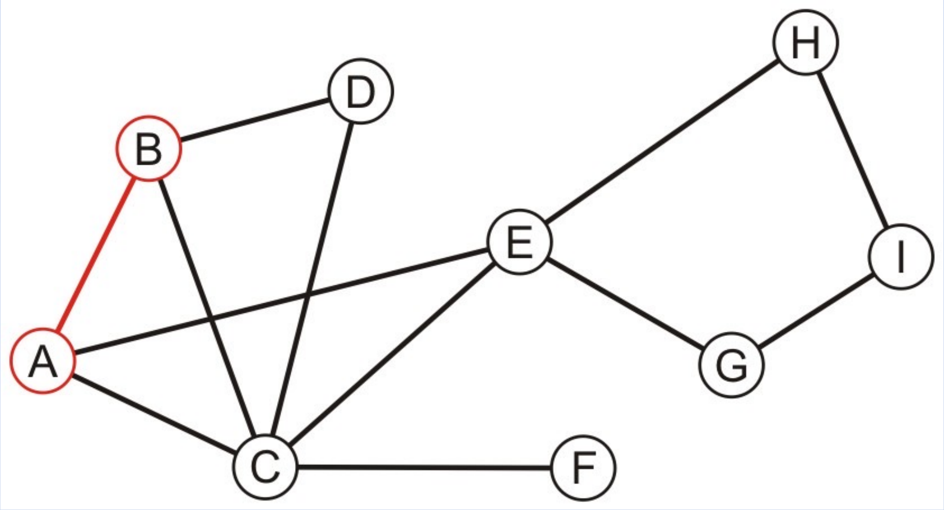
B	C	E			

Example

Performing a breadth-first traversal:

- Pop B and push D

A, B



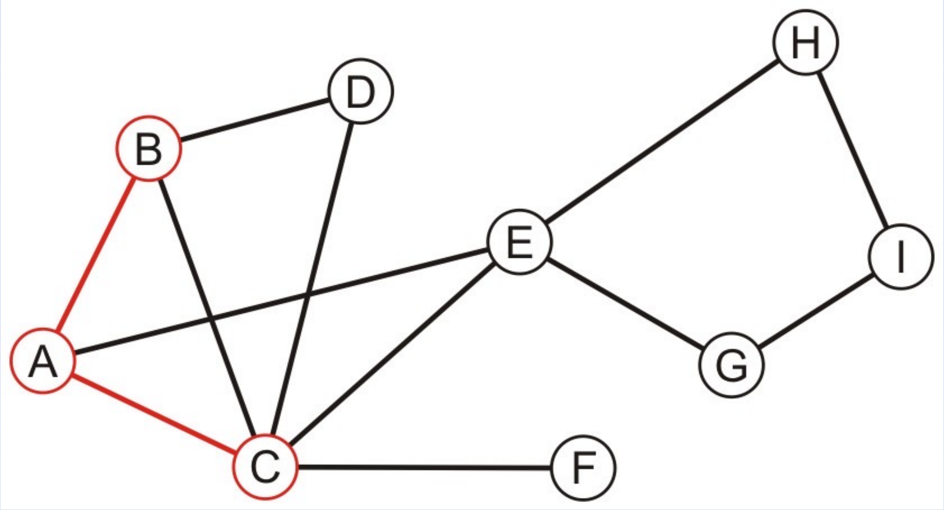
C	E	D			

Example

Performing a breadth-first traversal:

- Pop C and push F

A, B, C



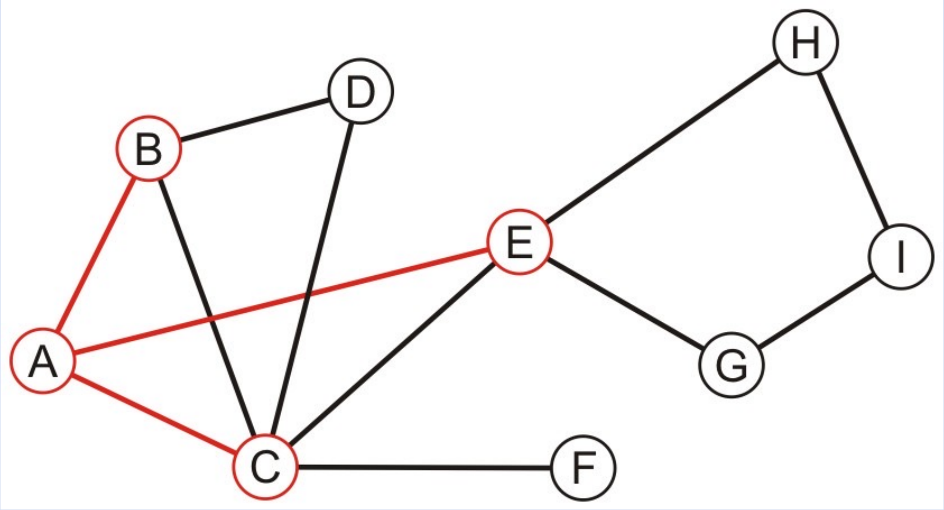
E	D	F			

Example

Performing a breadth-first traversal:

- Pop E and push G and H

A, B, C, E



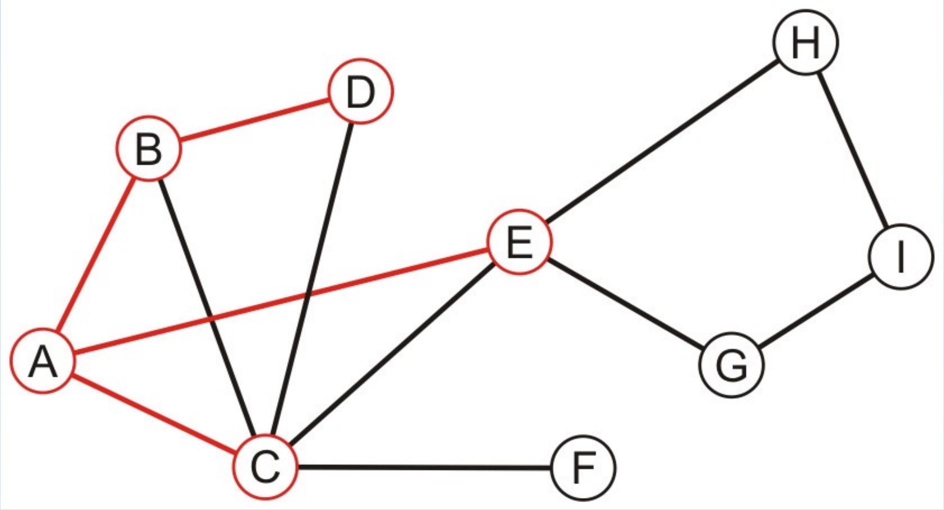
D	F	G	H		

Example

Performing a breadth-first traversal:

- Pop D

A, B, C, E, D



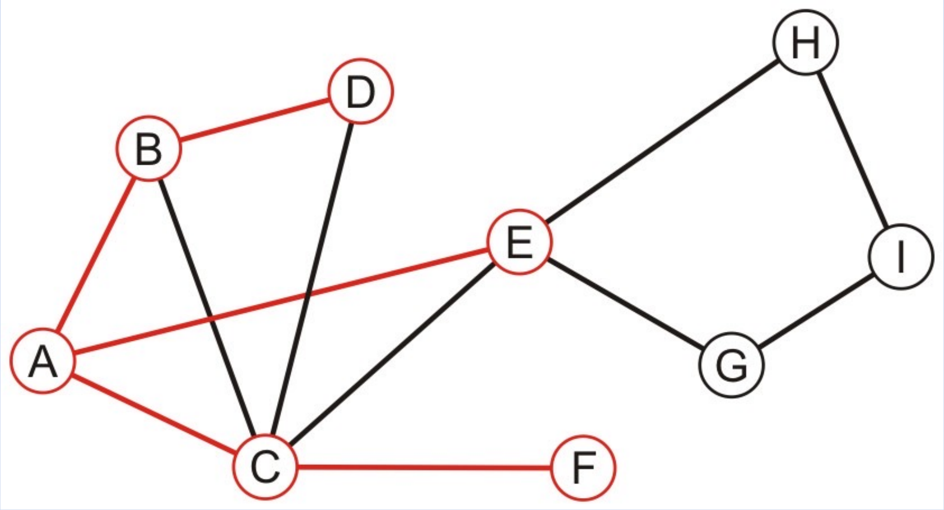
F	G	H			

Example

Performing a breadth-first traversal:

– Pop F

A, B, C, E, D, F



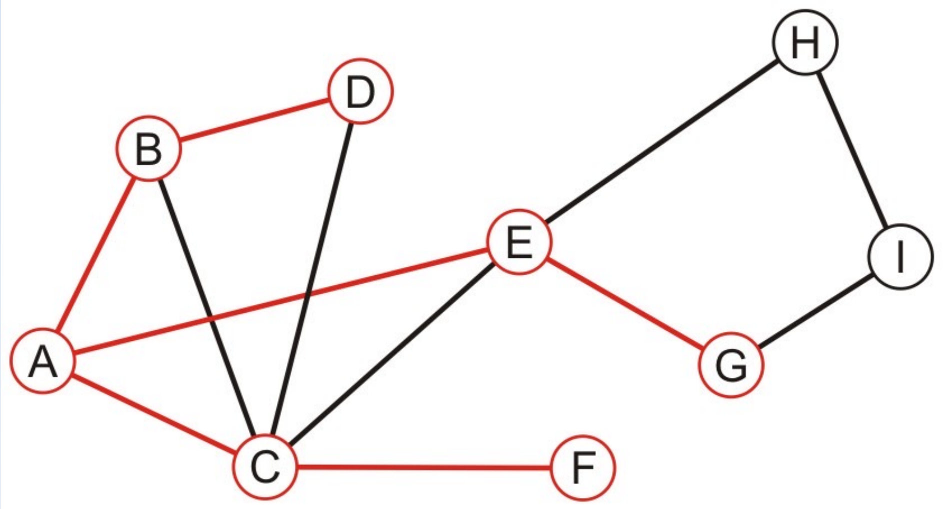
G	H				

Example

Performing a breadth-first traversal:

- Pop G and push I

A, B, C, E, D, F, G



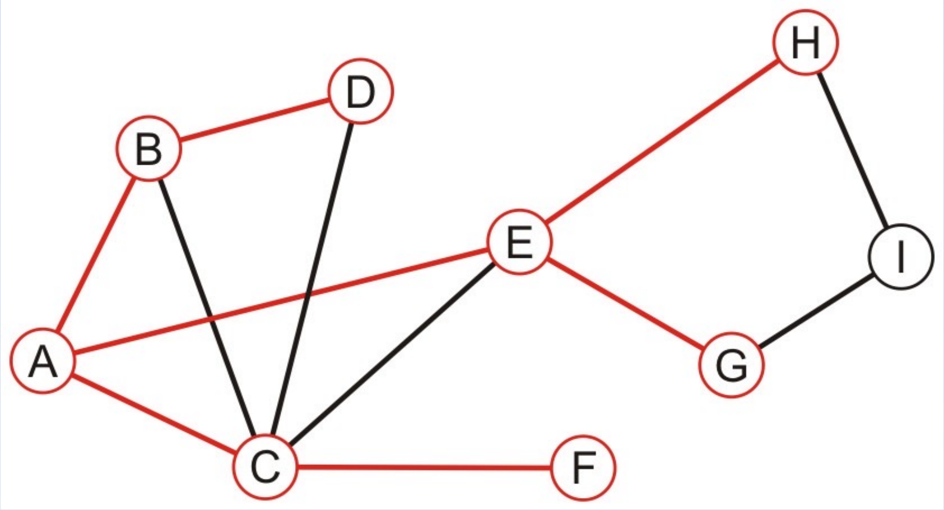
H	I				

Example

Performing a breadth-first traversal:

– Pop H

A, B, C, E, D, F, G, H

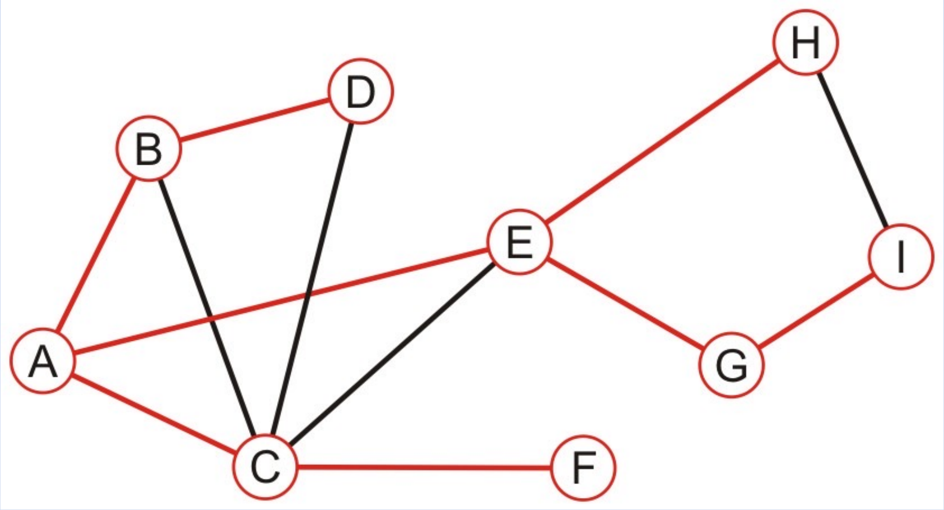


Example

Performing a breadth-first traversal:

– Pop I

A, B, C, E, D, F, G, H, I

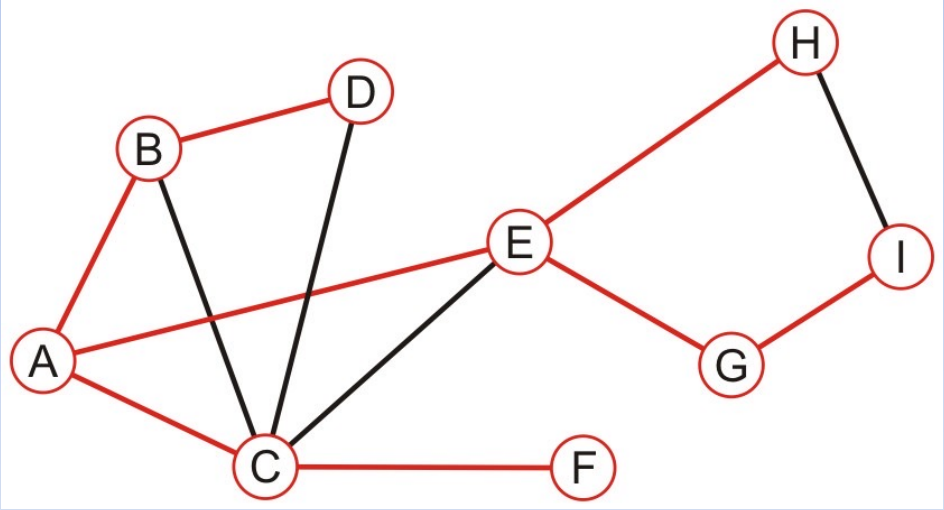


Example

Performing a breadth-first traversal:

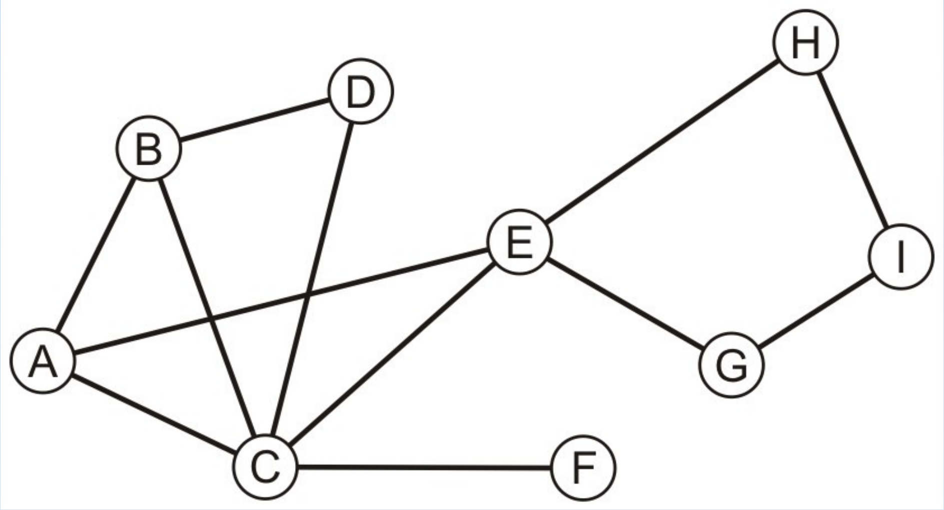
- The queue is empty: we are finished

A, B, C, E, D, F, G, H, I



Example

Perform a recursive depth-first traversal on this same graph

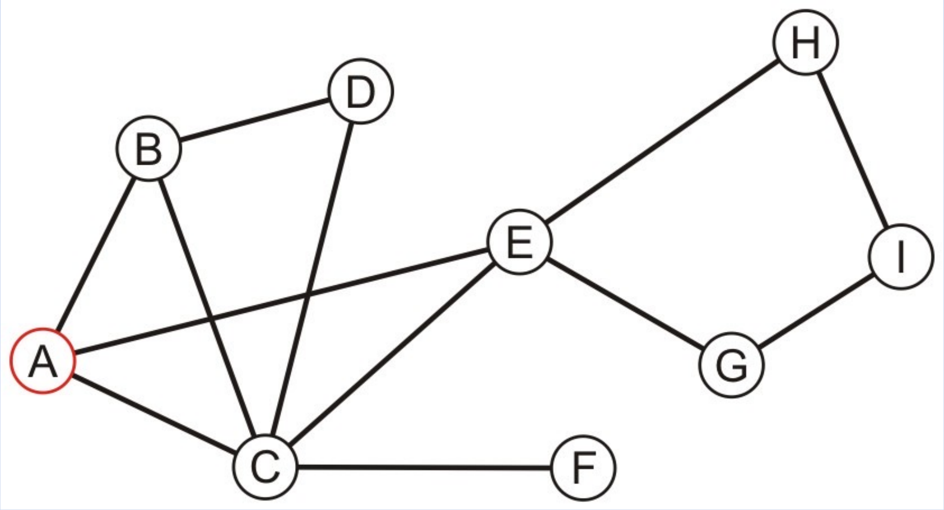


Example

Performing a recursive depth-first traversal:

- Visit the first node

A

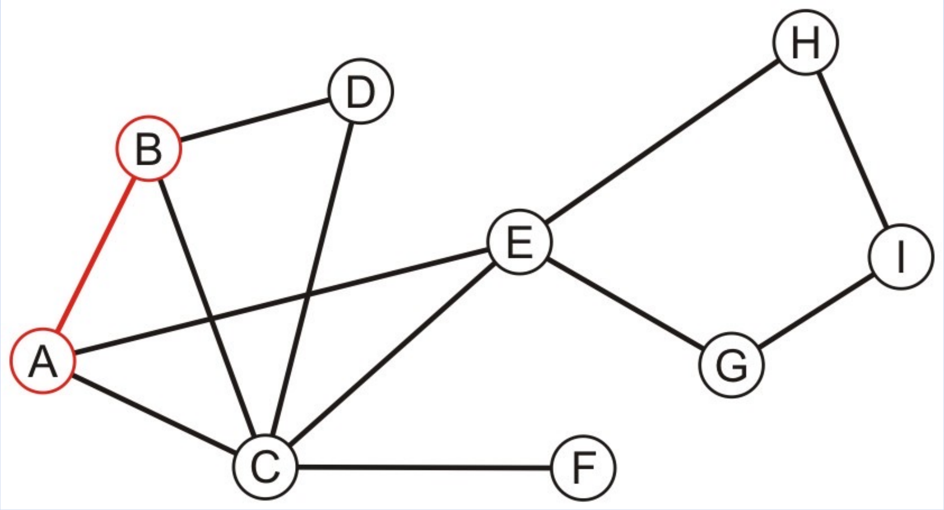


Example

Performing a recursive depth-first traversal:

– A has an unvisited neighbor

A, B

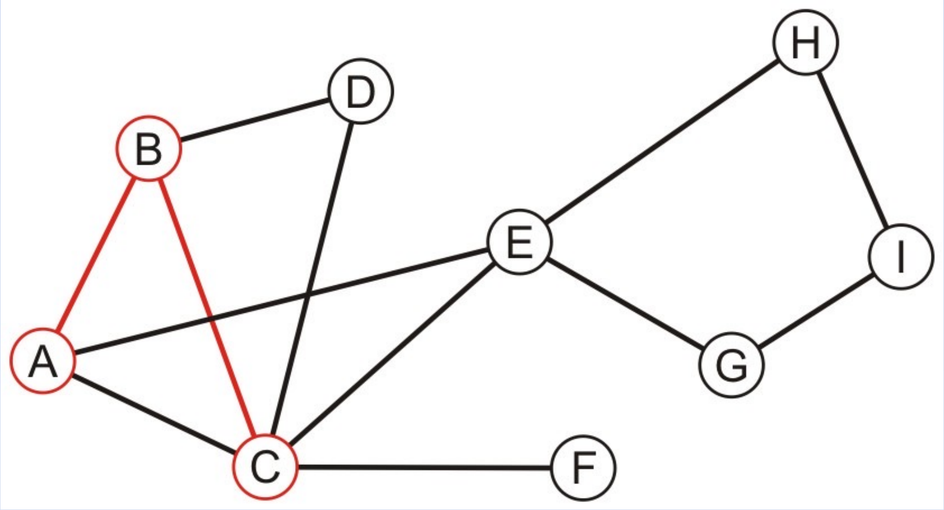


Example

Performing a recursive depth-first traversal:

- B has an unvisited neighbor

A, B, C

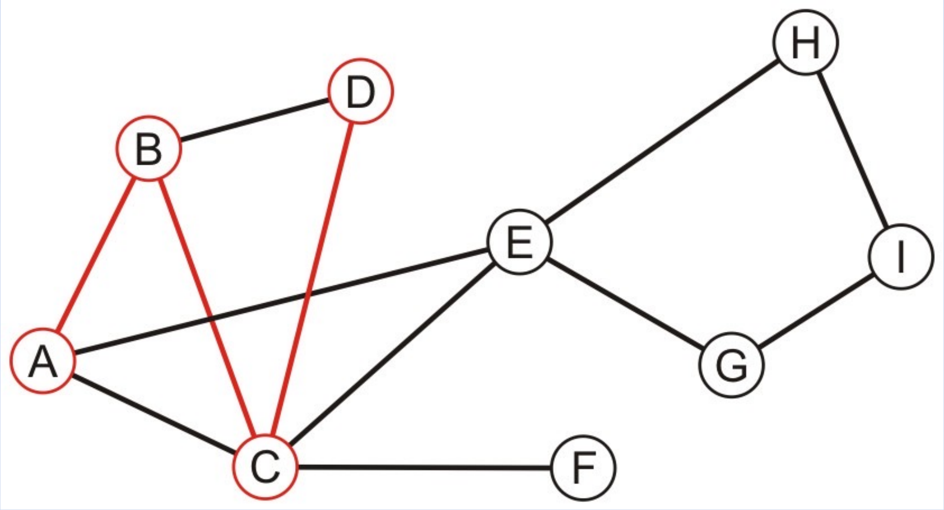


Example

Performing a recursive depth-first traversal:

- C has an unvisited neighbor

A, B, C, D

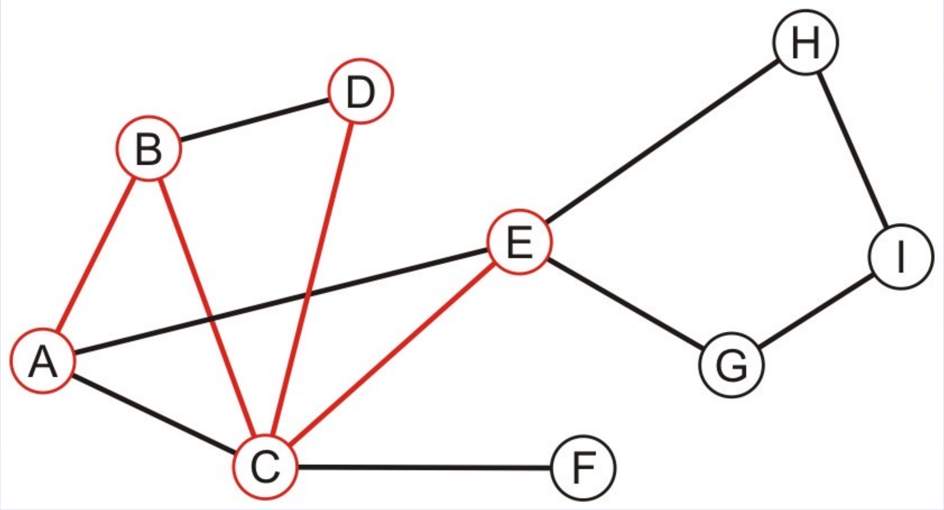


Example

Performing a recursive depth-first traversal:

- D has no unvisited neighbors, so we return to C

A, B, C, D, E

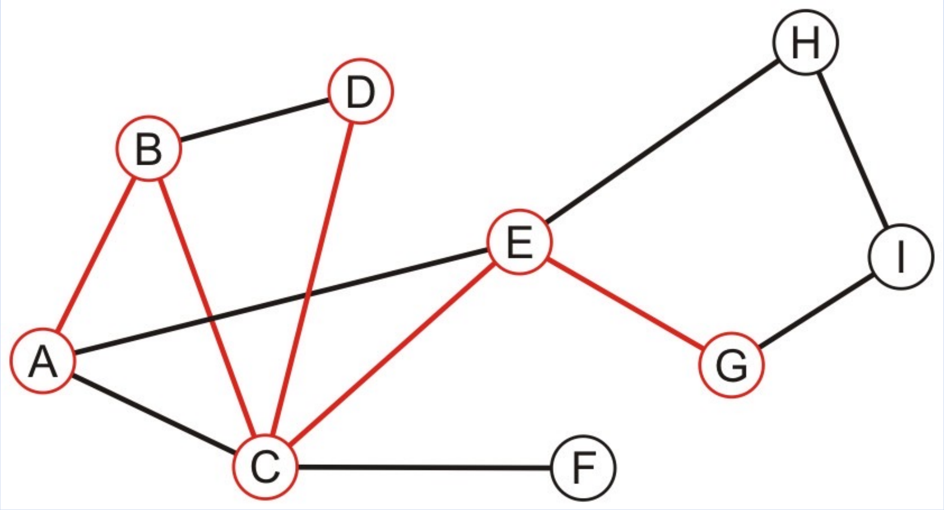


Example

Performing a recursive depth-first traversal:

- E has an unvisited neighbor

A, B, C, D, E, G

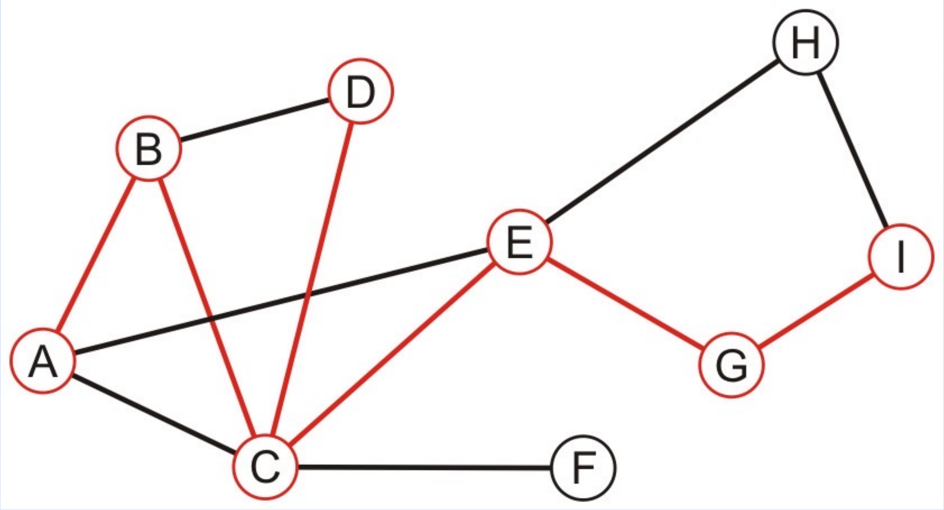


Example

Performing a recursive depth-first traversal:

- F has an unvisited neighbor

A, B, C, D, E, G, I

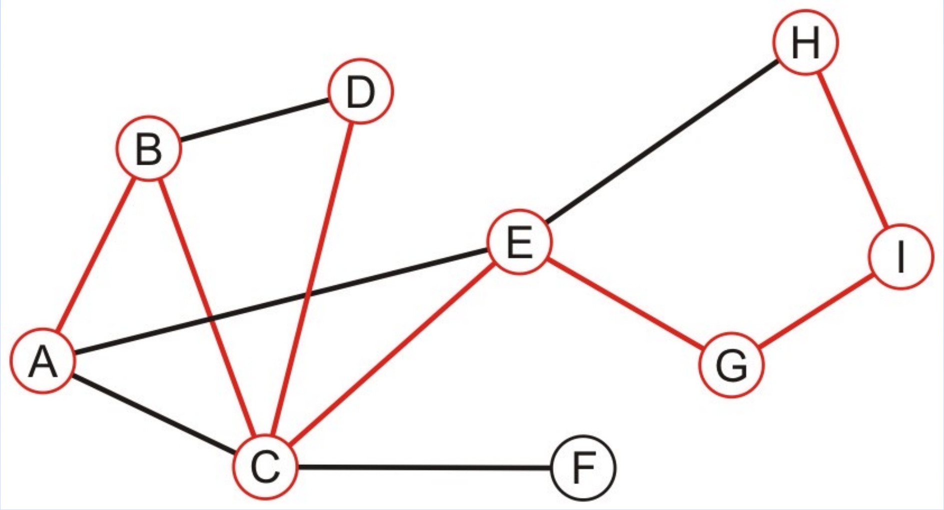


Example

Performing a recursive depth-first traversal:

- H has an unvisited neighbor

A, B, C, D, E, G, I, H

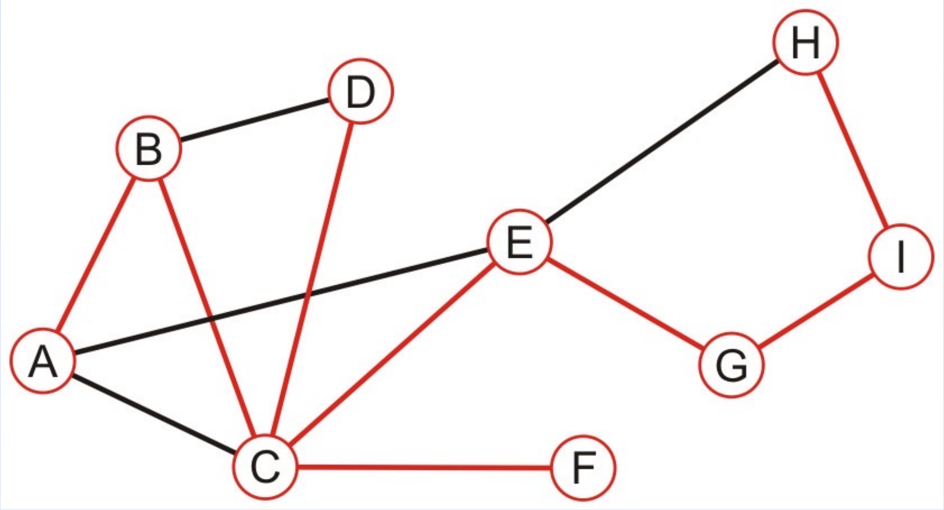


Example

Performing a recursive depth-first traversal:

- We recurse back to C which has an unvisited neighbour

A, B, C, D, E, G, I, H, F

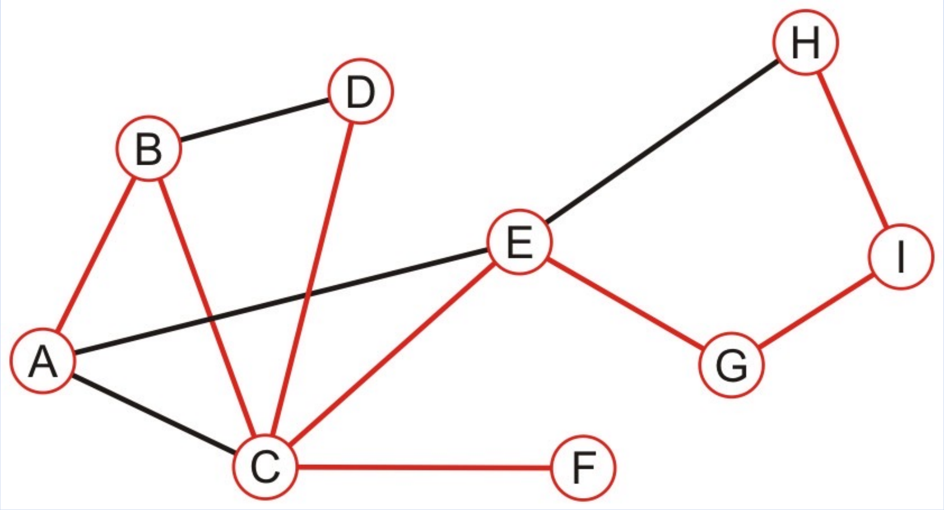


Example

Performing a recursive depth-first traversal:

- We recurse finding that no other nodes have unvisited neighbours

A, B, C, D, E, G, I, H, F

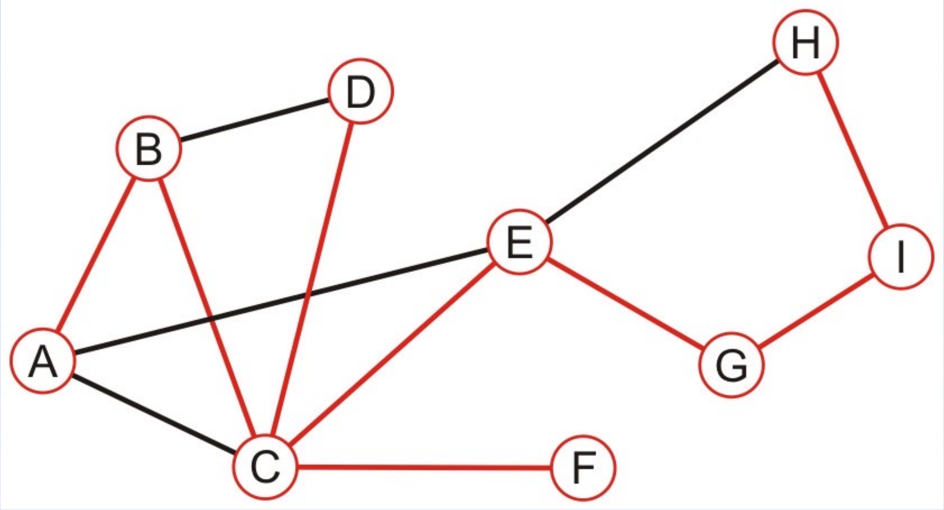


Comparison

Performing a recursive depth-first traversal:

– We recurse finding that no other nodes have unvisited neighbours

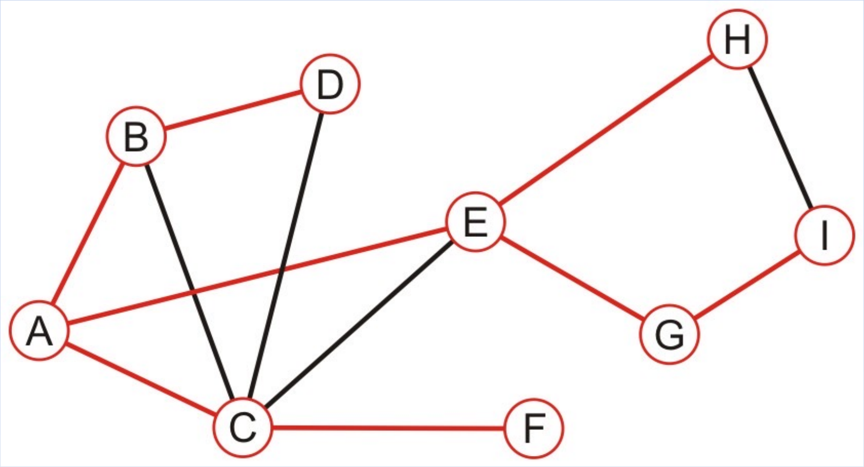
A, B, C, D, E, G, I, H, F



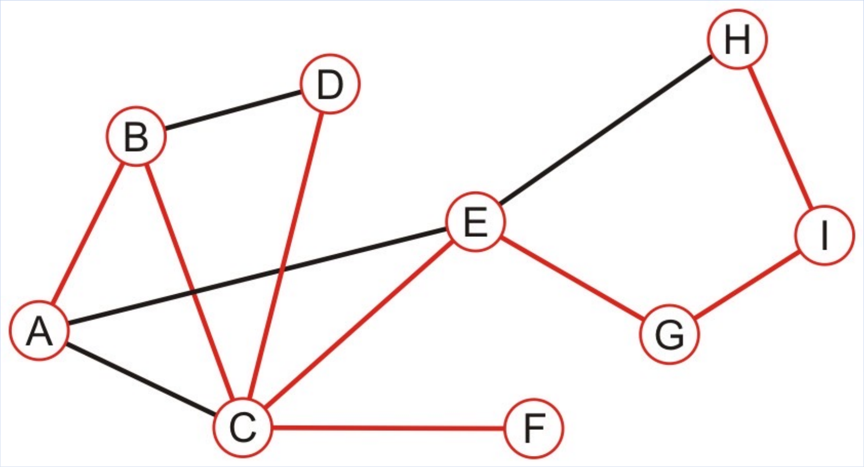
Comparison

The order in which vertices can be traversed differ greatly

A, B, C, E, D, F, G, H, I



A, B, C, D, E, G, I, H, F



Applications

Applications of tree traversals include:

- Determining connectiveness and finding connected sub-graphs
- Determining the path length from one vertex to all others
- Testing if a graph is bipartite
- Determining maximum flow
- Cheney's algorithm for garbage collection