Graph Traversal

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Depth first search (DFS)

- search for the brave
- start at an arbitrary vertex, mark as visited
- on each iteration, proceed to unvisited adjacent vertices
- continue until you reach a dead end (no more unvisited adjacent vertices)
- back-track up one edge, and check for unvisited vertices
- algorithm halts after backing up to starting vertex, reaching a dead end
- all vertices in a connected component with the starting vertex must have been visited
- restart on any other unvisited vertices
- DFS search produces a **DFS forest** with start vertex at root
- DFS forest of an undirected graph has:

    - **tree edge**: edge leading a previously unvisited vertex
    - **back edge**: edge leading to previously visited vertex, other than immediate predecessor

- DFS forest of a directed graph may have, in addition:

    - **forward edge**: edge leading to a non-child descendant
    - **cross edge**: edge leading to a vertex in a different sub-tree

Breadth first search