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12/5/2020

HW #4

Github link: https://github.com/Chase1242/HW4.git

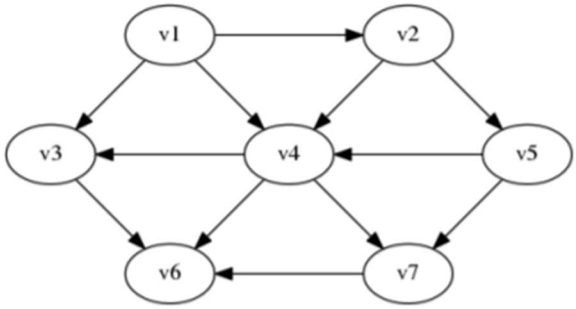
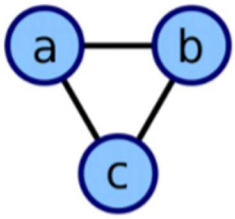
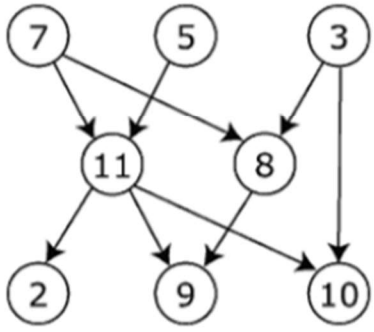
Professor Guizani

1. Define these terms as they relate to graph and graph algorithms: Use mathematical terms where appropriate.
    a. Graph - A set that consists of edges and vertices
    b. Vertices - a point on a graph that is usually connected to another vertex
    c. Edge - Connects two vertices
    d. Undirected graph - a graph where you can go any way on any edge
    e. Directed graph – a graph that requires you to follow the edges in a specific way, i.e. the edges have a direction
    f. Path - a sequence of vertices describes a route
    g. Loop – A path that has length one and starts and ends on itself
    h. Cycle – a graph of at least length one where you can get back to where you started
    i. Acyclic – a graph that does not allow you to get back to where you started
    j. Connected – connected if there is a path from every vertex to every other vertex
    k. Sparse – When the number of edges is less than the number of vertices

    l. Weight – the cost to take a certain route
2. We would want to use an adjacency matrix when the graph is dense and an adjacency list when the graph is sparse
3. One problem is using a graph to navigate to somewhere in the world. A second problem would be when you have an AI searching for a player in the game. A third problem would be for a 20 questions game, that uses a binary search tree.
4. A directed, cyclic graph
5. On vertex 7
6. 7 vertices, 17 edges

7.

7. [6] Are these cyclic or acyclic graphs?

	Cyclic? Yes No
	Cyclic? Yes No
	Cyclic? Yes No

8. Directed, Acyclic graph
9. A breadth-first search searches the adjacent nodes first, determining the length of the path along the way. A depth-first search uses a stack to keep track of the nodes. If a node is not visited, then it gets pushed onto the stack, doing this until it cannot anymore. When it cannot continue, the algorithm pops off the stack until a node hasn't been visited and repeats the process.
10.

Node: Distance	Priority Queue

(from A) B: 5	A, B
(from B) D: 2	A, B, D
(from D) F: 3	A, B, D, F
(from F) E: 1	A, B, D, F, E
(from E) C: 1	A, B, D, F, E, C

11.

a. MAD2104, degree of 8
b. CDA 4101, indegree of 3
c. MAD 2104, out degree of 6
d. Topo sort: MAC3311, COP3210, COP3400, COP3337, COP4555, MAD2104, CAP3700, MAD3305, MAD3512, COP3530, CIS4610, COP5621, COP 4540, CDA4101, CDA4400, COP4610, COP4225