CptS 223 Homework #4 - Graphs

Please complete the homework problems on the following page using a separate piece of paper. Note that this is an individual assignment and all work must be your own. Be sure to show your work when appropriate.

1. [13] Define these terms as they relate to graph and graph algorithms: Use mathematical terms where appropriate.

Graph G =(V,E) consists of a set of edges, E._ _

Vertice _nods in the graph__

Edge line of path that connect two or one nod_____

Undirected Graph Each Edge do not have front and back and can be traversed in either direction

Directed Graph Each edge front and a back and a direction____

Path ___sequence of vertices_____

Loop path that lead 1 nod to it self (v,v) ___

Cycle __ directed graph of at least length 1 such that w1 == wn (you get back to the start w)_____ __

Acyclic _____Graph does not have cycles_____

Connected ____There is path from every vertex to every other vertex

Sparse ___Number of vertex is larger than number of edges_____

Weight ____value that path has which can be “Cost”

2. [4] Under what circumstances would we want to use an adjacency matrix instead of an adjacency list to store our graph?

If we want to know the weights of each data path and want to find out the shortest path rather than just list of data

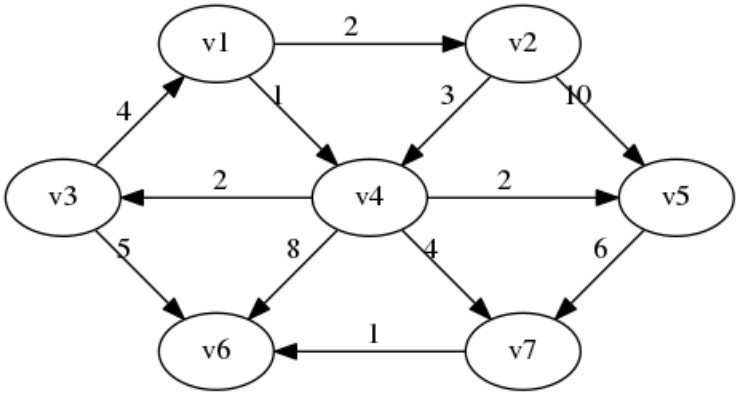
3. [6] Name three problems or situations where a graph would be a good data structure to use:

Making Navigation

Building the infrastructure road of town

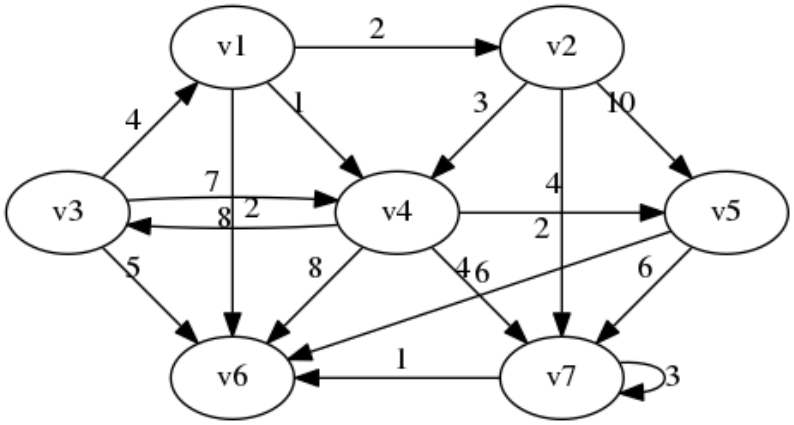
Making flight map for every airport connected

4. [4] What kind of graph is this?



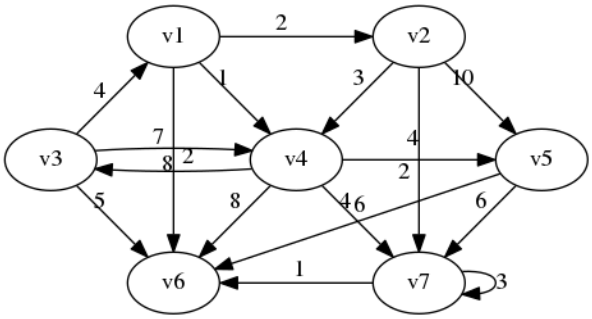
Directed connected graphs with weight

5. [4] Identify the loop in this graph:

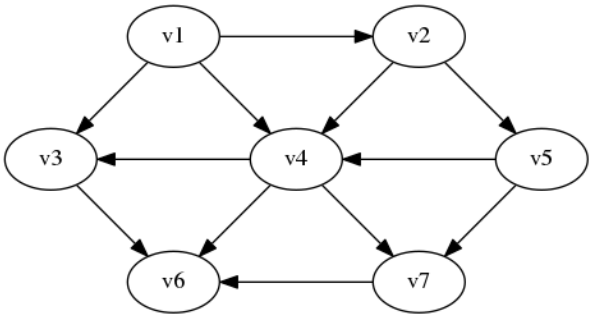


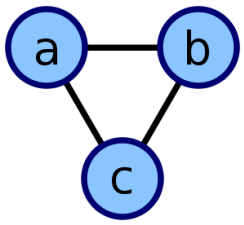
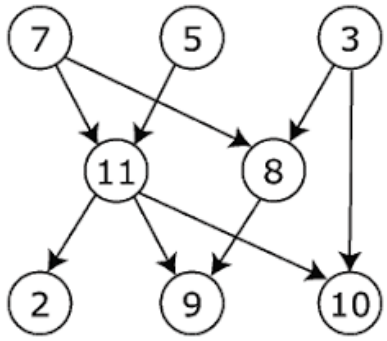
V7 has loop with weigth 3

6. [4] How many vertices and edges are in this graph:

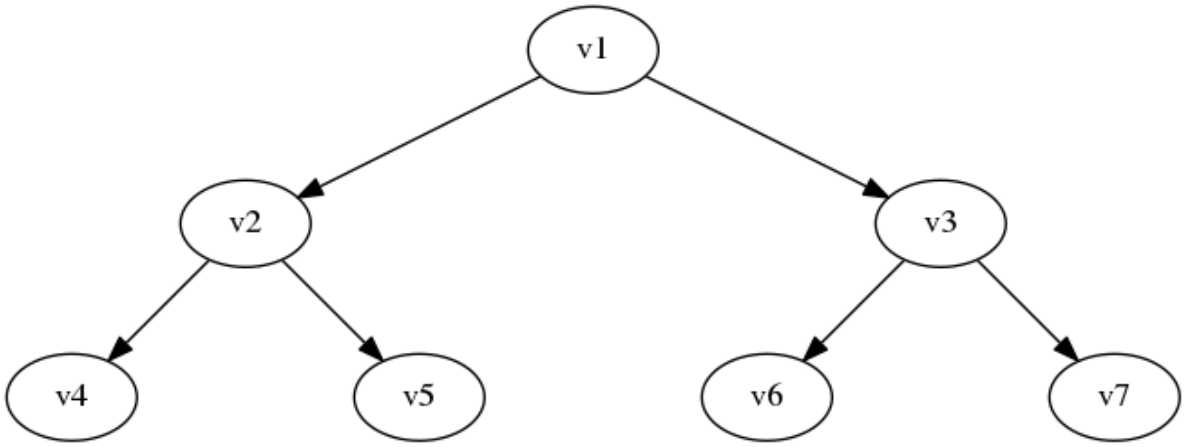
	Vertices ___7_____ Edges _____17_____

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

	Cyclic? (Yes)

	Cyclic? No
	Cyclic? Yes

8. [5] A tree is a particular kind of graph. What kind of graph is that?



Directed acyclic graph

9. [4] What is the difference between a breadth-first search and a depth first search?

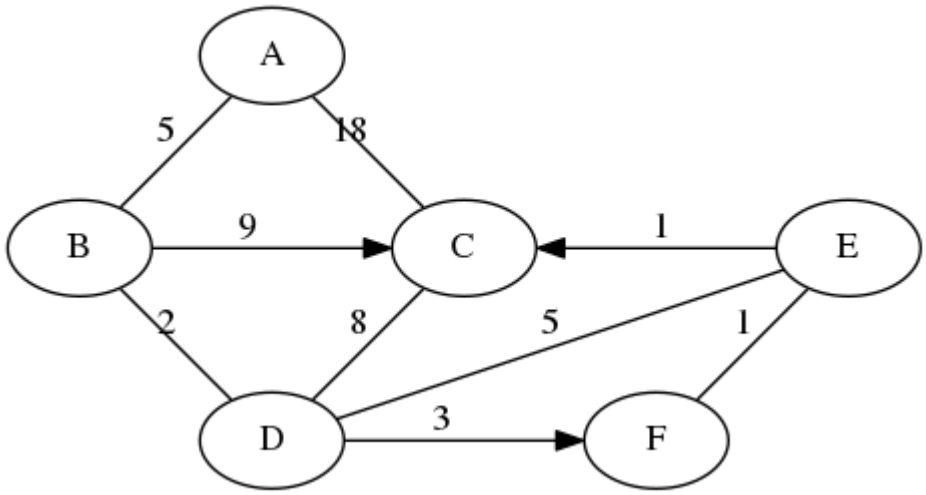
The breadth first search examine the network in layers starting from a root node.

However the Depth-First search just start with any vertex V then recursively process all vertices adjacent to V

10. [10] Dijkstra's Algorithm. Use Dijkstra's Algorithm to determine the shortest path starting at **A**. Note that edges without heads are bi-directional. To save time,

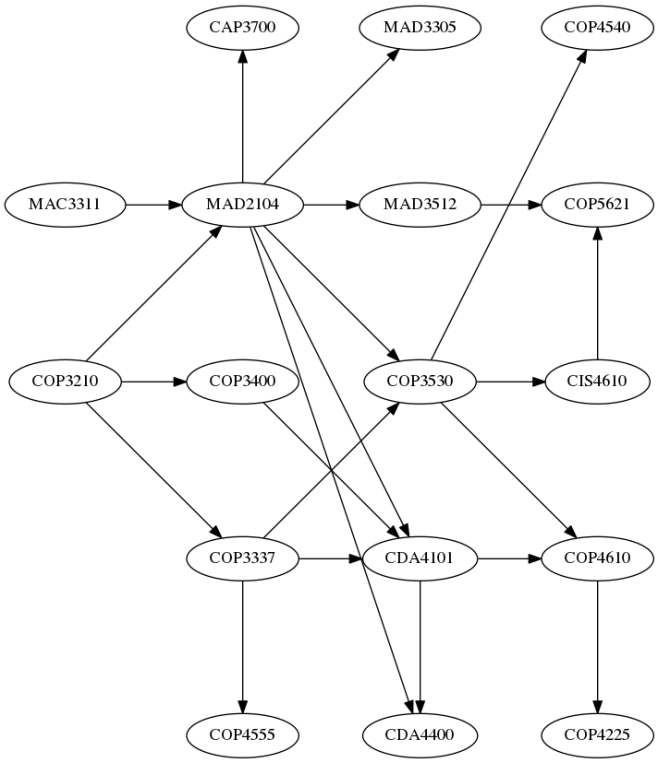
you do not have to add items to the "priority queue" column after it has been discovered (listed in the "distance" column). Use the table below to show your work.

What's the shortest route (by weight) from A to C? _____A-B-D-F-E-C_____



Node: Distance	Priority Queue
0	A
5	B
7	D
10	F
11	E
12	C

11. [10] Topo sort. Show the final output of running Topo Sort on this graph:



What's the vertice with the largest degree and its value?

MAD2104
,7

What's the vertice with the highest indegree and its value?

CDA4101 , 3

What's the vertice with the highest outdegree and its value?
MAD2104, 5

Topo sort output:

MAC3311 COP 3210

MAD2104 COP3400 COP3337 CAP3700 COP4555

MAD3512 COP3530 CDA4400 MAD 3305 CDA4101

COP4540 COP5621 CIS4610 COP4610 COP4255