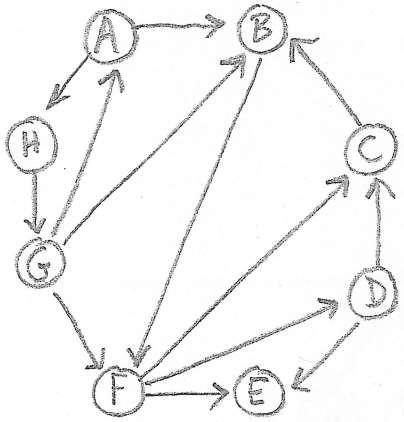
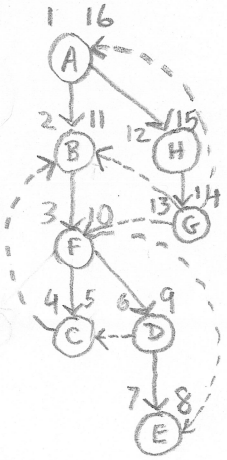
CS:3330 Quiz 3, Spring 2018

1. Hand execute Depth-first Search on the following directed graph. As output of your execution show the pre and post visit numbers for each vertex in the graph. Also, identify each edge as a (a) tree edge, (b) forward edge, (c) back edge, or (d) cross edge. You may assume that whenever vertices are considered one after the other in the DFS algorithm, they are considered in alphabetical order.





pre-numbers are shown on left & post-numbers on right of each node.

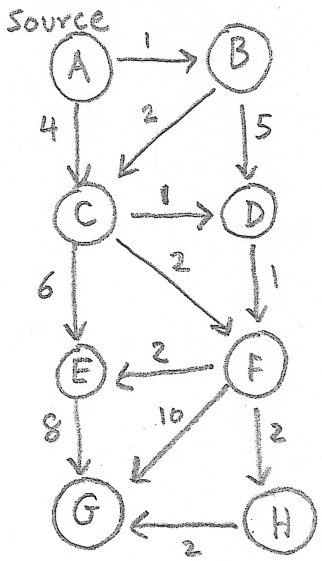
Back edges
(C, B), (G, A)

Cross edges
(D, C), (G, B), (G, F)

Forward edges
(F, E)

The rest are tree edges.

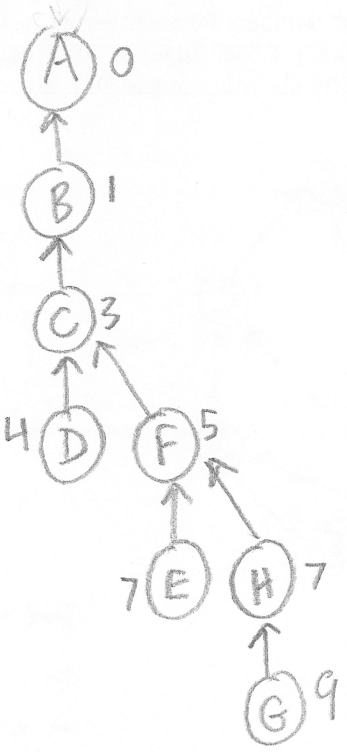
2. Hand execute Dijkstra's shortest path algorithm on the following edge-weighted graph. As output of your execution, draw a table showing the intermediate distance and predecessor values at every vertex at each iteration of the algorithm. Also, show the final shortest path tree. You may assume that whenever vertices are considered one after the other in Dijkstra's algorithm, they are considered in alphabetical order.



	dist	pred	dist	pred	dist	pred	dist	pred	dist	pred	dist	pred
A	0✓	nil	0✓	nil	0✓	nil	0✓	nil	0✓	nil	0✓	nil
B	∞	nil	1✓	A	1✓	A	1✓	A	1✓	A	1✓	A
C	∞	nil	4	A	3✓	B	3✓	B	3✓	B	3✓	B
D	∞	nil	∞	nil	6	B	4✓	C	4✓	C	4✓	C
E	∞	nil	∞	nil	∞	nil	9	C	9	C	7✓	F
F	∞	nil	∞	nil	∞	nil	5	C	5✓	C	5✓	C
G	∞	nil	∞	nil	∞	nil	∞	nil	∞	nil	15	F
H	∞	nil	∞	nil	∞	nil	∞	nil	∞	nil	7	F
	Initially		Iteration 1		Iteration 2		Iteration 3		Iteration 4		Iteration 5	

Turn over

Shortest path tree



Final values

	dist	pred	dist	pred	dist	pred
A	0 ✓	nil	0 ✓	nil	0	nil
B	1 ✓	A	1 ✓	A	1	A
C	3 ✓	B	3 ✓	B	3	B
D	4 ✓	C	4 ✓	C	4	C
E	7 ✓	F	7 ✓	F	7	F
F	5 ✓	C	5 ✓	C	5	C
G	15	F	9 ✓	H	9	H
H	7 ✓	F	7 ✓	F	7	F
	Iteration 6		Iteration 7		Iteration 8	