65 points total

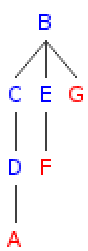
1.

⅗ for process, no tree
⅘ for process, incorrect tree
⅖ for only showing order, no tree
⅕ for tree, no work
5/5 if tree is right, work or not

a. (5 points)

(indegree, outdegree)
A: (1, 2)
B: (1, 3)
C: (2, 2)
D: (2, 2)
E: (3, 2)
F: (2, 0)
G: (1, 1)

b. BFS tree (5 points)



Q = {B}
D = {}

Process B
Q = {C, E, G}
D = {B}

Process C
Q = {E, G, D}
D = {B, C}

Process E
Q = {G, D, F}
D = {B, C, E}

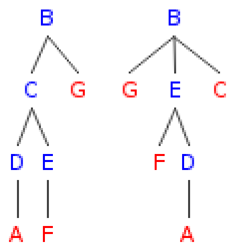
Process G
Q = {D, F}
D = {B, C, E, G}

Process D
Q = {F, A}
D = {B, C, E, G, D}

Process F
Q = {A}
D = {B, C, E, G, D, F}

Process A
Q = {}
D = {B, C, E, G, D, F, A}

c. DFS Tree (5 points)



S = {B}
D = {}

Process B
S = {C, E, G}
D = {B}

Process G
S = {C, E}
D = {B, G}

Process E
S = {C, D, F}
D = {B, G, E}

Process F
S = {C, D}
D = {B, G, E, F}

Process D
S = {C, A}
D = {B, G, E, F, D}

Process A
S = {C}
D = {B, G, E, F, D, A}

Process C
S = {}
D = {B, G, E, F, D, A, C}

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

2.
a. (10 Points... -2 pts/incorrect path)

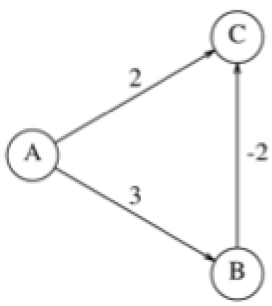
A to …	Shortest Weighted Path	Weighted Length
B	A => B	5
C	A => C	3
D	A => B => G => E => D	9
E	A => B => G => E	7

F	A => B => G => E => F	8
G	A => B => G	6

b. (5 points... -1 pt/incorrect path)

B to ...	Shortest Unweighted	Unweighted Length
A	B => C => D => A	3
C	B => C	1
D	B => C => D	2
E	B => E	1
F	E => E => F	2
G	B => G	1

3. (5 points)



4. (10 points)

(b) Use an array *numEdges* such that for any vertex u, *numEdges[u]* is the shortest number of edges on a path of distance d_u from s to u known so far. Thus *numEdges* is used as a tiebreaker when selecting the vertex to mark. As before, v is the vertex marked known, and w is adjacent to v.

If $d_v + c_{v,w} = d_w$, then change p_w to v and *numEdges[w]* to *numEdges[v]+1* if *numEdges[v]+1* < *numEdges[w]*.

If $d_v + c_{v,w} < d_w$, then update p_w and d_w, and set *numEdges[w]* to *numEdges[v]+1*.

5. (5 points) Check diagonals of resulting tables to see if there are any negative values.

6.
a. (10 points)

D	**1**	**2**	**3**	**4**	**5**
1	0	-10	-9	-7	-3
2	inf	0	2	4	8
3	inf	-1	0	3	7
4	inf	-3	-2	0	5

5	inf	-7	-6	-4	0

P	**1**	**2**	**3**	**4**	**5**
1	-	3	4	5	1
2	-	-	4	5	2
3	-	3	-	5	2
4	-	3	4	-	2
5	-	3	4	5	-

b. (5 points)

Path S/E	**1**	**2**	**3**	**4**	**5**
1	-	15432 (-10)	1543 (-9)	154 (-7)	15 (-3)
2	-	-	2543 (2)	254 (4)	25 (8)
3	-	32 (-1)	-	3254 (3)	325 (7)
4	-	432 (-3)	43 (-2)	-	4325 (5)
5	-	5432 (-7)	543 (-6)	54 (-4)	-