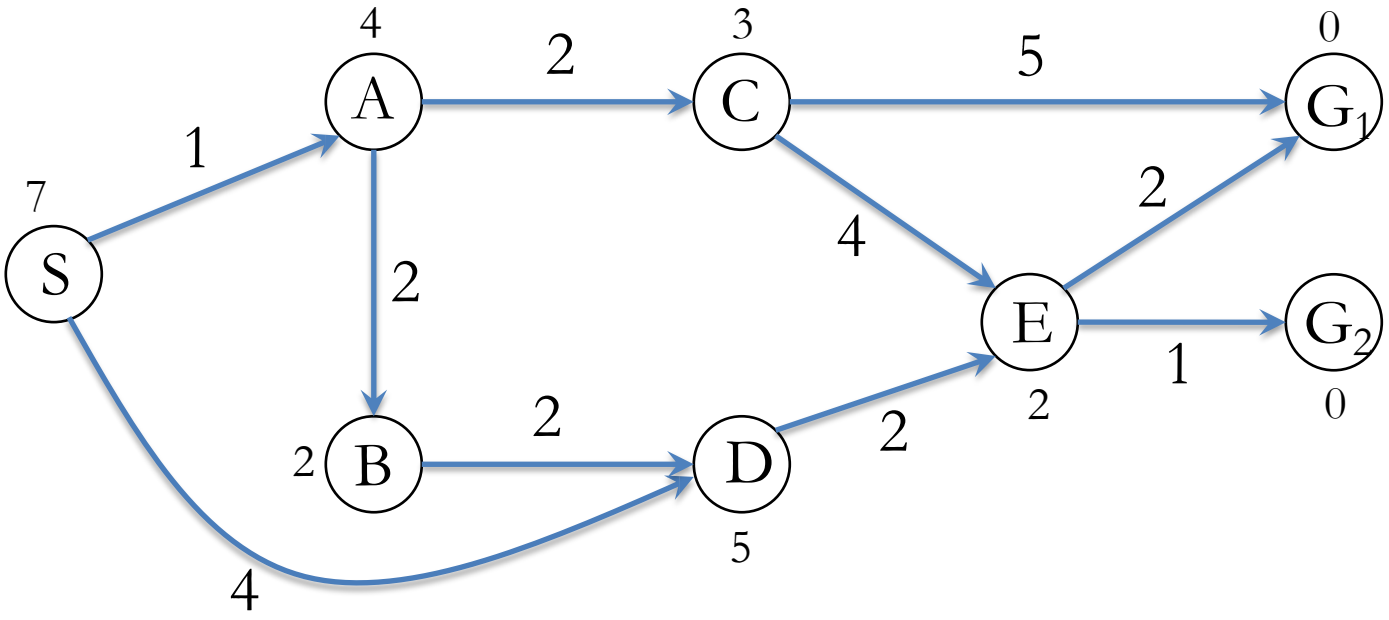
Homework Week 2

1. Consider the search graph below. The h value of a node is given adjacent to that node. The actual cost of traversing an arc (in either direction) is given adjacent to that arc. Node S is the start/initial state. Nodes G_1 and G_2 are goals. Use this graph for Question 1.



When you have completed all the questions, upload a pdf of the questions and answers to Brightspace and take the "quiz" portion of homework 1 as many times as you wish – see the Syllabus for grading policy. You may consult the pdf (and your revisions) while you take the "quiz" component.

1. Give the order in which nodes are visited (i.e., checked for goalness) by **heuristic depth first search**. In the case of two or more nodes with the same evaluation score on the frontier, break the tie by visiting the nodes in alphabetical order as labeled above – this same convention applies to the remaining parts of this question. For this question ONLY, assume that "reached" (as described in the videos) is NOT used.

HDFS			
Step	**Visited Node**	**Expanded Node**	**Frontier**
1	S(7)	SA(4), SD(5)	S(7)
2	SA(4)	SAB(2), SAC(3)	SA(4), SD(5)
3	SAB(2)	SABD(5)	SAB(2), SAC(3), SD(5)
4	SABD(5)	SABDE(2)	SAC(3), SABD(5), SD(5)
5	SABDE(2)	SABDEG1(0), SABDEG2(0)	SABDE(2), SAC(3), SD(5)
6	SABDEG1(0)	-	SABDEG1(0), SABDEG2(0), SAC(3), SD(5)

2. Give the order in which nodes are visited (i.e., checked for goalness) by **greedy best-first search**.

Greedy Best First Seach			
Step	**Visited Node**	**Expanded Node**	**Frontier**
1	S(7)	SA(4), SD(5)	S(7)
2	SA(4)	SAB(2), SAC(3)	SA(4), SD(5)
3	SAB(2)	SABD(5)	SAB(2), SAC(3), SD(5)
4	SAC(3)	SACEG1(0), SACE(2)	SAC(3), SABD(5), SD(5)
5	SACEG1(0)	-	SACEG1(0), SACE(2), SABD(5), SD(5)

3. Give the order in which nodes are visited (i.e., checked for goalness) by **lowest cost-first search**.

Dijkstra's Algorithm			
Step	**Visited Node**	**Expanded Node**	**Frontier**
1	S(0)	SA(1), SD(4)	S(0)
2	SA(1)	SAB(3), SAC(3)	SA(1), SD(4)
3	SAB(3)	SABD(5)	SAB(3), SAC(3), SD(4)
4	SAC(3)	SACE(7), SACG1(8)	SD(4)
5	SD(4)	SDE(6)	SD(4), SACE(7), SACG1(8)
6	SDE(6)	SDEG2(7), SDEG1(8)	SDE(6), SACE(7), SACG1(8)
7	SDEG2(7)	-	SDEG2(7), SDEG1(8)

4. Give the order in which nodes are visited (i.e., checked for goalness) by **A***.

A* Search			
Step	**Visited Node**	**Expanded Node**	**Frontier**
1	S(7)	SA(5), SD(9)	S(7)
2	SA(5)	SAB(5), SAC(6)	SA(5), SD(9)
3	SAB(5)	SABD(10)	SAB(5), SAC(6), SD(9)
4	SAC(6)	SACG1(8), SACE(9)	SAC(6), SD(9), SABD(10)
5	SACG1(8)	-	SACG1(8), SACE(9), SD(9), SABD(10)

5. Which nodes would be checked for goalness on the first iteration of **iterative deepening A***?

Iterative deepening A* Search							
Iteration	**Cutoff**	**Step**	**Visited**	**Expanded Node**	**Nodes over cutoff**	**Frontier**	**Min exceeding f-value**
1	7	1	S (7)	SA (5), SD (9)	SD (9)	SA (5)	9
1	7	2	SA (5)	SAB(5), SAC(5)	SD (9)	SAB(5), SAC(5)	9
1	7	3	SAB(5)	SABD(10)	SABD(10)	SAC(5)	10
1	7	4	SAC(5)	SACG1(8), SACE(9)	SACG1(8), SACE(9)	-	8
2	8	1	S (7)	SA (5), SD (9)	SD (9)	SA (5)	9
2	8	2	SA (5)	SAB(5), SAC(5)	-	SAB(5), SAC(5)	-
2	8	3	SAB(5)	SABD(10)	SABD(10)	SAC(5)	10
2	8	4	SAC(5)	SACG1(8), SACE(9)	SACE(9)	SACG1(8)	9
2	8	5	SACG1(8)	-	-	-	-