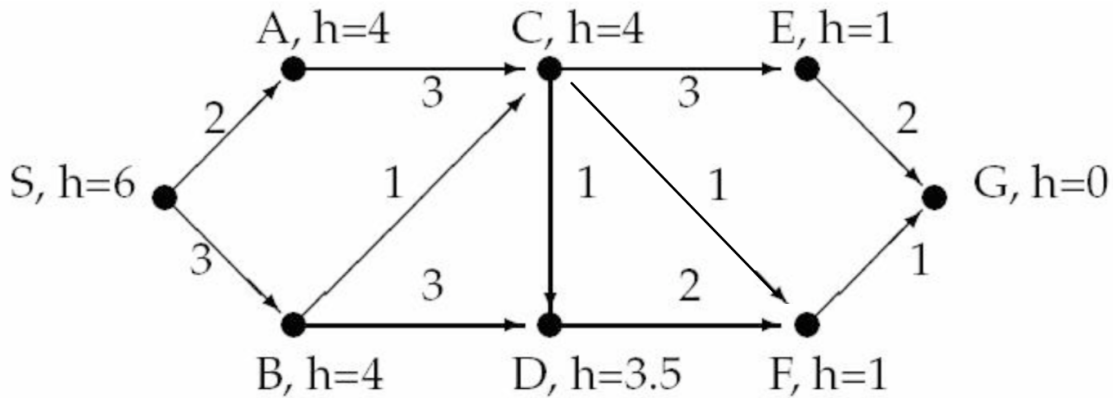


This test is open book and open note.

Version B

1. (40 points) Consider the following graph. You must show the operation of the A\* search algorithm, starting with node S and ending at node G. Show all steps in the table below. Each node is labeled with its heuristic value. On each line of the table, list the f, g, and h values of the nodes. We have done the first two lines as an example. In case of a tie between nodes, choose the node that comes earlier in the alphabet.

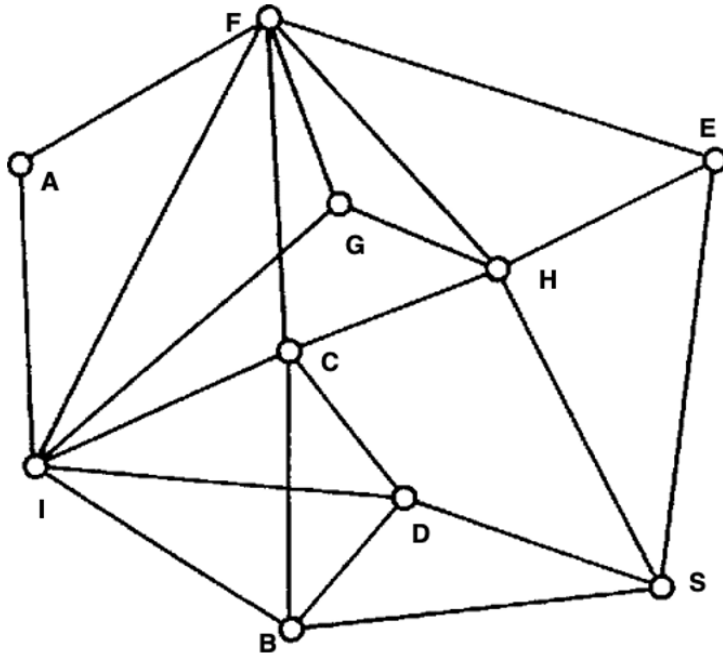


Expanded	fringe
	S(6,0,6)
S	A(6,2,4), B(7,3,4)
A	B(7,3,4), Ca(9,5,4)
B	Ca(9,5,4), Cb(8,4,4), Db(9.5,6,3.5)
Cb	Db(9.5,6,3.5), E(8,7,1), Fc(6,5,1), Dc(8.5,5,3.5)
Fc	Db(9.5,6,3.5), E(8,7,1), Dc(8.5,5,3.5), Gf(6,6,0)
G	
G-F-C-B-S	

<i>Iteration</i>	<i>Node expanded</i>	<i>Priority Queue (aka fringe, open list) Notation for a node is NAME(F value, G value, H value)</i>
0	--	S(6,0,6)
1	S	A(6,2,4), B(7,3,4)
2		
3		
4		
5		
6		
7		
8		
9		
10		
11		

2. (40 points) Consider the following graph.

- (a) Show the operation of the depth-first search algorithm, starting with S and ending at G.  
 Show all steps in your work. Break ties by choosing the node that is earlier in the alphabet.
- (b) Show the operation of the breadth-first search algorithm, starting with S and ending at G.  
 Show all steps in your work. Break ties by choosing the node that is earlier in the alphabet.



DFS

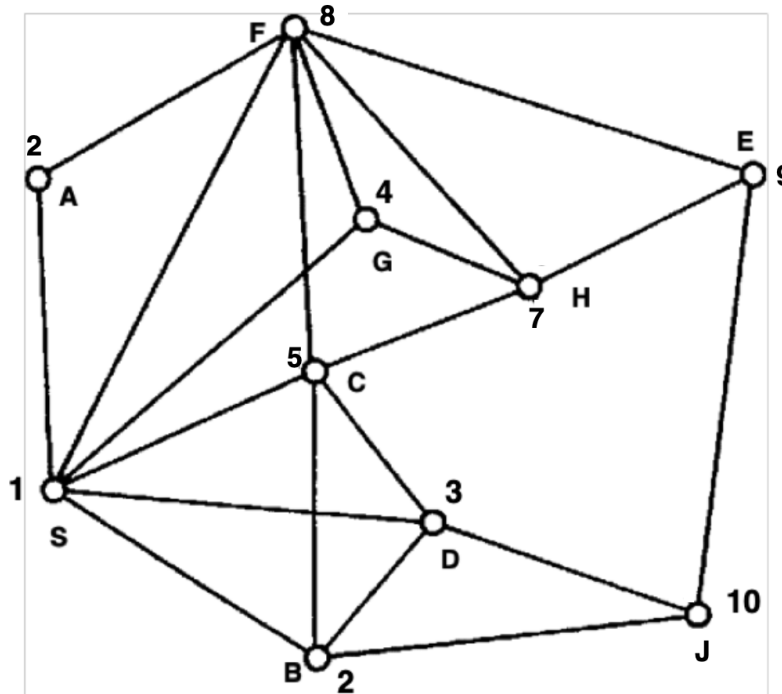
Expanded	Fringe
	S(0)
S	B(1), D(1), E(1), H(1)
B	C(2), D(2), I(2), D(1), E(1), H(1)
C	D(3), F(3), H(3), I(3), D(2), I(2), D(1), E(1), H(1)
Dc	I(4), F(3), H(3), I(3), D(2), I(2), D(1), E(1), H(1)
I	A(5), F(5), G(5), ...
A	F(6), ...
Fa	E(7), G(7), H(7), ...
E	H(8), ...
H	G(9), ...
G	
G-H-E-F-A-I-D-C-B-S	

BFS

Expanded	Fringe
	S(0)
S	B(1), D(1), E(1), H(1)
B	D(1), E(1), H(1), Cb(2), D(2), Ib(2)
D	E(1), H(1), Cb(2), Ib(2), Cd(2), Id(2)
E	H(1), Cb(2), Ib(2), Cd(2), Id(2), Fe(2), H(2)

H                   Cb(2), Cd(2), Id(2), Fe(2), Fh(2), Ce(2), G(2)  
 Cb                   Ib(2), Id(2), Fe(2), Fh(2), G(2), Fc(3), Ih(3)  
 Fe                   Ib(2), Id(2), G(2), Ih(3), A(3), If(3), G(3)  
 G  
 G-H-S

3. (20 points) Consider the following graph. You must show the operation of the hill-climbing search algorithm, starting with location S. The value of each node is next to the node. Show all steps in your work. In case of a tie between nodes, choose the node that comes earlier in the alphabet.



Expanded	Fringe
	S(1)
S	A(2), F(8), G(4), C(5), D(3), B(2)
F	A(2), C(5), G(4), H(7), E(9), S(1)
E	F(8), J(10), H(7), F(8)
J	D(3), B(2), E(9)
Stop	