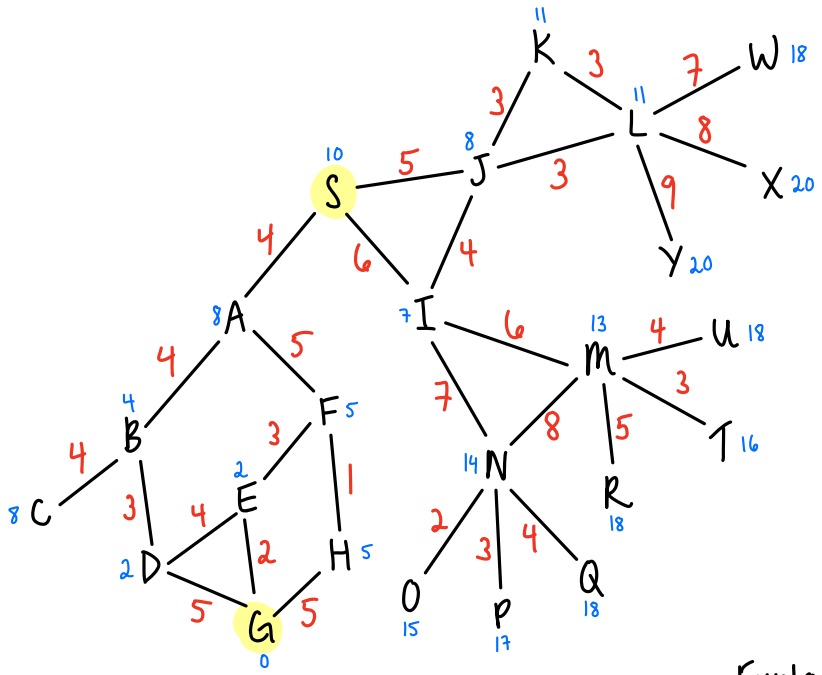
Jane Downer

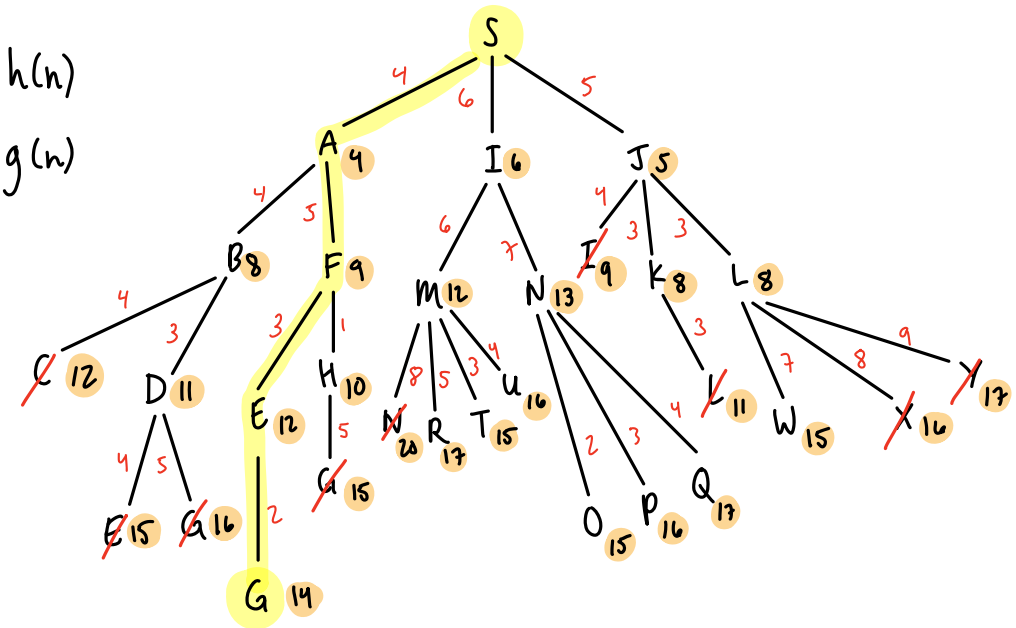
A-B: 4	J-K: 3
A-S: 4	J-L: 3
A-F: 5	J-S: 5
B-C: 4	K-L: 3
B-D: 3	L-W: 7
D-E: 4	L-X: 8
D-G: 5	L-Y: 9
E-F: 3	M-N: 8
E-G: 2	M-R: 5
F-H: 1	M-T: 3
G-H: 5	M-U: 4
I-J: 4	N-O: 2
I-M: 6	N-P: 3
I-N: 7	N-Q: 4
I-S: 6	



1. Uniform Cost Search

: h(n)

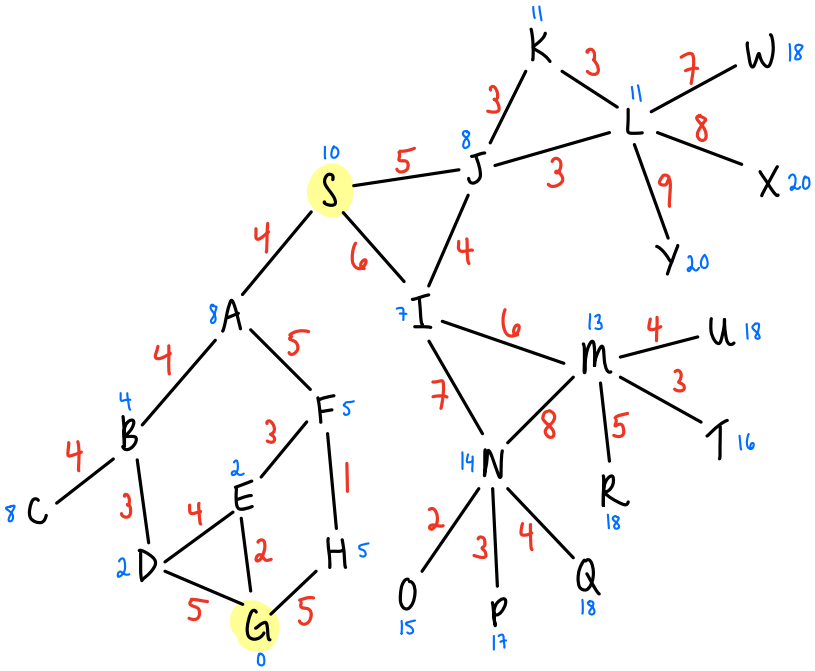
: g(n)



Explored	Frontier
S	~~A~~
A	~~I~~
J	~~J~~
I	~~B~~
B	~~F~~
K	~~X~~
L	~~L~~
F	~~M~~
H	~~N~~
D	~~C~~
M	~~D~~
C	~~W~~
E	~~X~~
N	~~Y~~
	~~E~~
	~~H~~
	G
	R
	T
	U
	O
	P
	Q

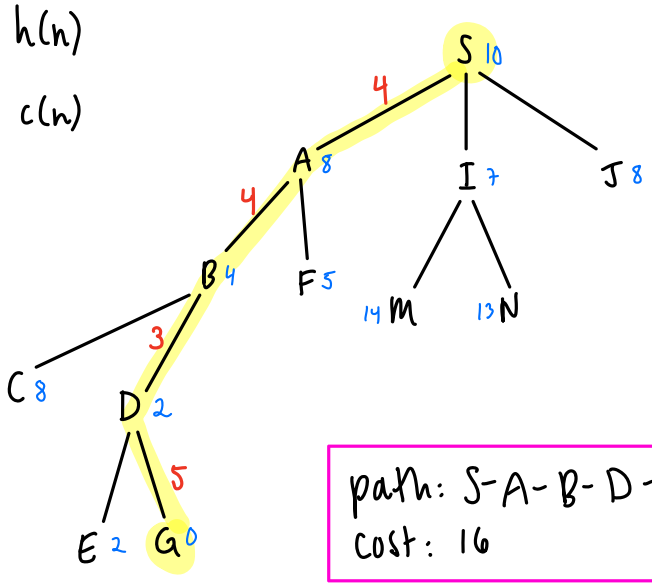
Path: S - A - F - E - G
Cost: 14

2. Heuristic best-first search



: h(n)

: c(n)



path: S-A-B-D-G
cost: 16

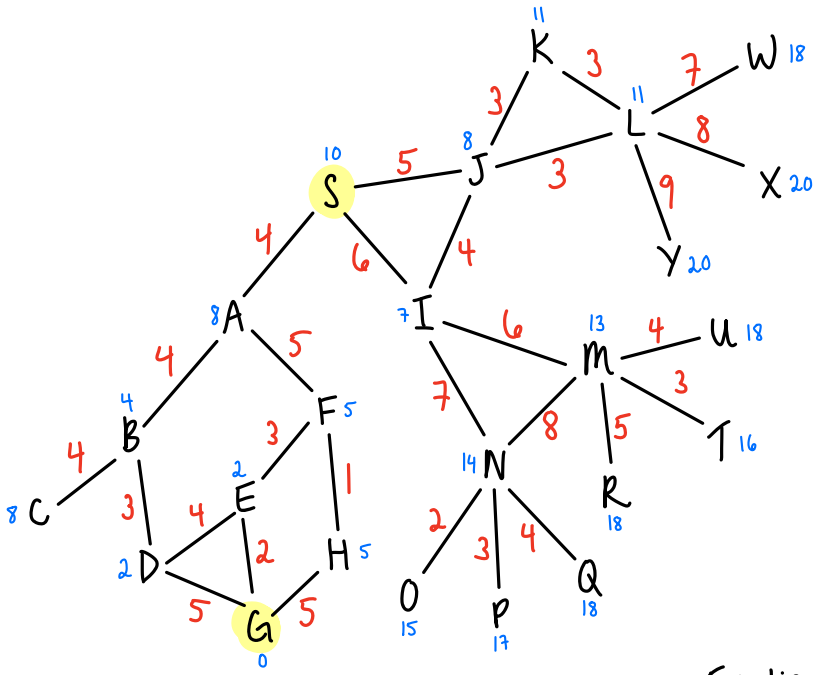
Frontier	Explored
~~S~~: 10	S
~~A~~: 8	I
~~I~~: 7	A
J: 8	B
m: 14	D
N: 13	
~~B~~: 4	
F: 5	
C: 8	
~~D~~: 2	
E: 2	
G: 0	

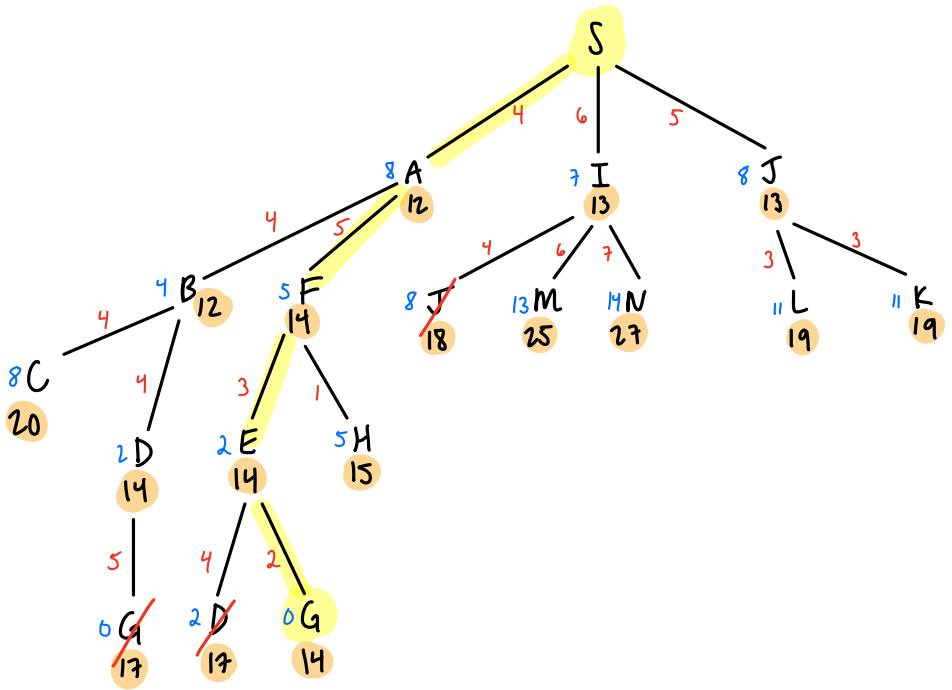
3. A* search

: h(n)

: c(n)

: f(n)





Frontier	Explored
~~S: 0~~	S
~~A: 12~~	A
~~I: 13~~	B
~~J: 13~~	I
~~B: 12~~	J
~~F: 14~~	F
C: 20	D
~~D: 14~~	E
M: 25	
N: 27	
L: 19	
K: 19	
~~E: 14~~	
H: 15	
~~G: 17~~	
G: 14	

path: S-A-F-E-G

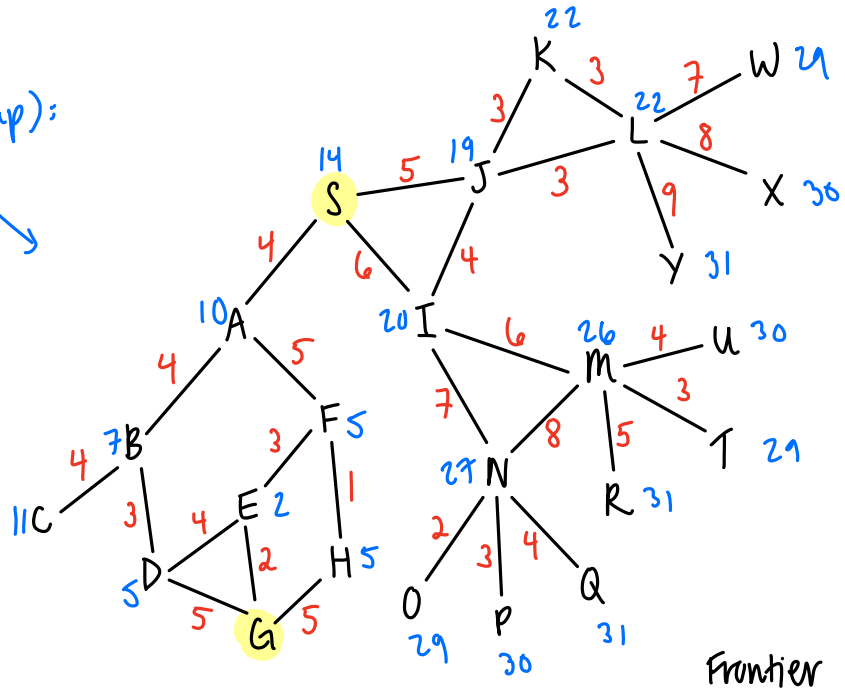
cost: 14

4. h is consistent, because c(n) + h(n) along any path is non-decreasing.

5. h could be the sum of the edge costs of the optimal path between a given node & G. This is consistent because f(n) will be non-decreasing along any path toward G. It dominates all other heuristics b/c it maximizes the heuristic value at each node and results in the smallest possible A* search tree.

6.

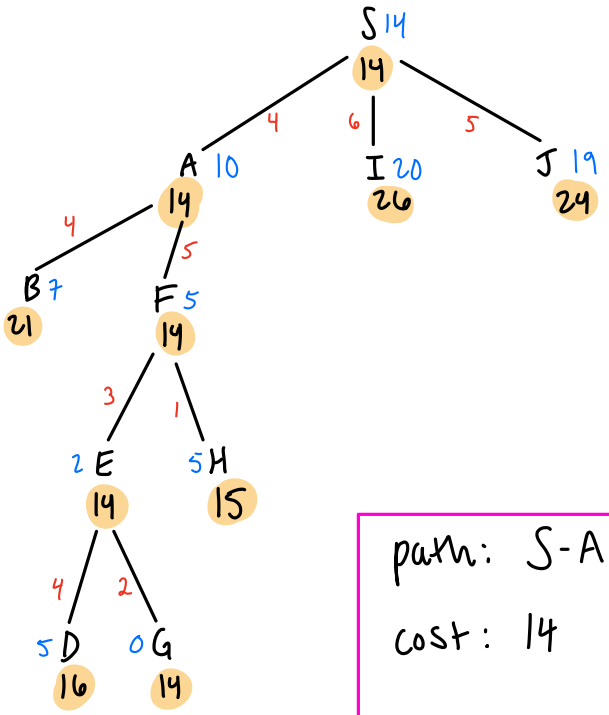
(in blue on map):



: h(n)

: c(n)

: f(n)



Frontier	Explored
~~S~~: 14	S
~~A~~: 14	A
I: 26	F
J: 24	E
B: 21	
~~F~~: 14	
~~E~~: 14	
H: 15	
D: 16	
G: 14	

path: S-A-F-E-G

cost: 14

This is the smallest possible optimal tree, because it only explores the nodes on the optimal path.