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Exercise 5

Abbreviations:

at-pigeon = P, *mes-found* = MF, *mes-sent* = MS

(i)

P=L1	**P=L2**	**P=L3**	**MF=T**	**MF=F**	**MS=T**	**MS=F**
0	∞	∞	∞	0	∞	0
0	1	1	∞	0	∞	0
0	1	1	2	0	∞	0
0	1	1	2	0	4	0
0	1	1	2	0	4	0

$h^{add}(I) = 4$

(ii)

$h^{max}(I) = 3$

Extracting a relaxed plan: (not in plan order)

send-mes; opens *mes-found-T*, *at-pigeon-L3*

move(L1, L3); opens nothing

take-mes; opens *at-pigeon-L2*

move(L1, L2); opens nothing

$h^{ff}(I) = 4$

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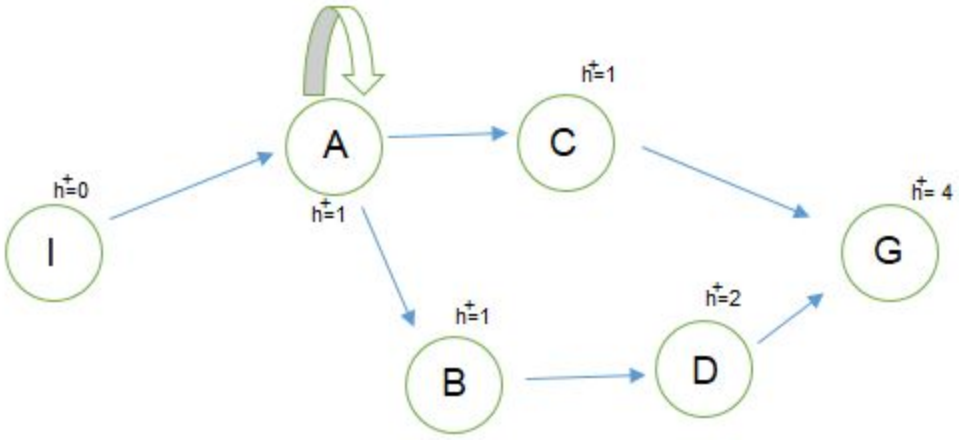
Exercise 6

Initializing variables used in the search graph;

Node	at-pigeon	mes-found	mes-sent
I	L1	false	false
A	L2	false	false
B	L2	true	false
C	L3	false	false
D	L3	true	false
G	L3	true	true

Search Graph;



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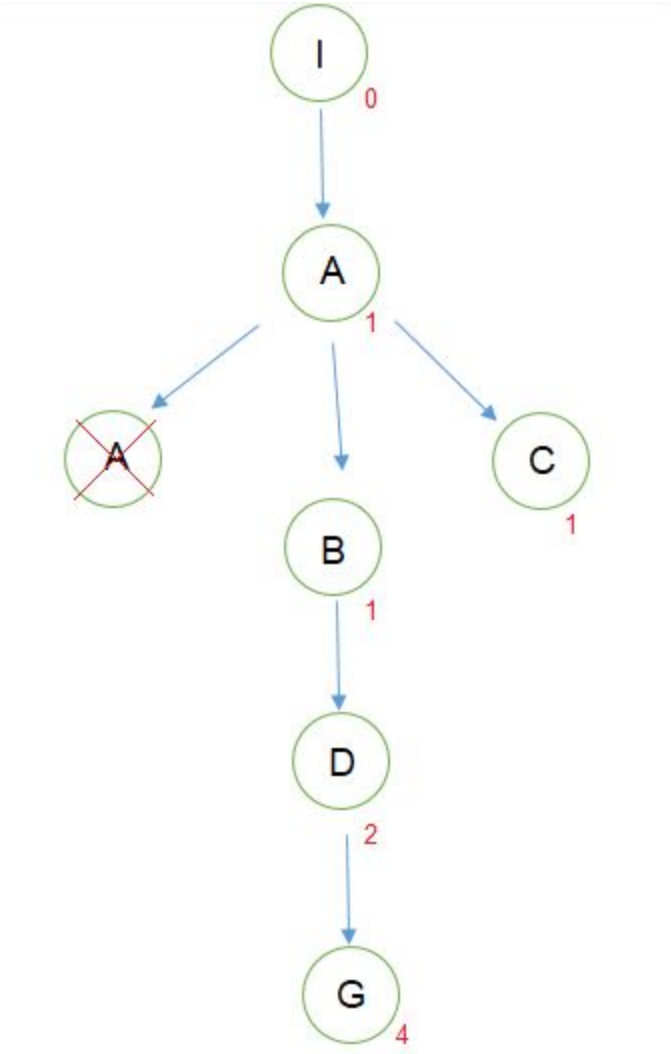
Annotated graph for Greedy Best First Search;



The table below shows, Order of Expansion;

Iterations	Current Node	Open Node	Selected Node
1	I	A	A
2	A	A,B,C	B
3	B	D	D
4	D	G	G
5	G (goal found)	none	none

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Exercise 7

Abbreviations:

at_pigeon = P, *mes-found* = MF

In the following table, MF=F is omitted because it does not appear in any pre-conditions for actions, and does not show up in a goal state, therefore, MF=F has no effect on the problem.

1.

P=L1	**P=L2**	**P=L3**	**MF=T**	**P=L1, P=L2**	**P=L1, P=L3**	**P=L1, MF=T**	**P=L2, P=L3**	**P=L2, MF=T**	**P=L3, MF=T**
0	∞	∞	∞	∞	∞	∞	∞	∞	∞
0	1	∞	∞	∞	∞	∞	∞	∞	∞
0	1	2	2	∞	∞	∞	∞	∞	∞
0	1	2	2	∞	∞	3	∞	∞	∞
0	1	2	2	∞	∞	3	4	∞	∞
0	1	2	2	∞	∞	3	4	5	∞
0	1	2	2	∞	∞	3	4	5	6
0	1	2	2	∞	∞	3	4	5	6

$h^2(I) = 3$

2.

$h^1(I) = 2$

The values for $h^1(I)$ and $h^2(I)$ are different because, in this case, the individual variable-value pairs in the goal statement are realized in separate states before a state containing both variable-value pairs is reached.