CS3243 Assignment 2

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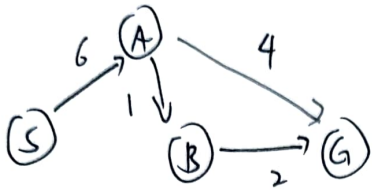
5. a)



	S	A	B	G	Admissible	Consistent
h_1	0	0	0	0	✓	✓
h_2	8	1	1	0	✓	X
h_3	9	3	2	0	✓	✓
h_4	6	3	1	0	✓	X
h_5	8	4	2	0	X	X
h^*	9	3	2	0		

since $h_5(A) = 4 > h^*(A) = 3$, h_5 is not admissible
since $h_2(S) = 8 > h_2(A) + 6 = 7$, h_2 is not consistent
since $h_4(A) = 3 > h_4(B) + 1 = 2$, h_4 is not consistent
since $h_5(A) = 4 > h_5(B) + 1 = 3$, h_5 is not consistent

b) graph search implementation of A* search using heuristic h_4 & graph search V3

	frontier	reached
Iter 1 =	[S((-), 0+6)]	[-]
Iter 2 =	[A((S), 6+3)]	[S]
Iter 3 =	[B((S,A), 7+1), G(S,A), 10+0)]	[S, A]
Iter 4 =	[G((S,A,B), 9+0), G(S,A), 10+0)]	[S, A, B]
Iter 5 =	DONE (S,A,B,G)	[S, A, B, G]

order of visitation is S - A - B - G

c) Efficiency of A^* search depends on accuracy of heuristic.

since h_3 dominates h_1, h_2 and h_4 among all admissible heuristics
it is more efficient than h_1, h_2 and h_4

in fact, $h_3 = h^*$

compared to h_5, h_3 is also both admissible & consistent, thus A^* using graph search will also be optimal

d) The heuristic $h(n) = \max\{h_3(n), h_5(n)\}$ is admissible

n	$h_3(n)$	$h_5(n)$	$h(n)$	$h^*(n)$
S	9	8	9	9
A	3	4	4	3
B	2	2	2	2
G	0	0	0	0

since $h(A) = 4 > h^*(n) = 3$, $h(n)$ is not admissible