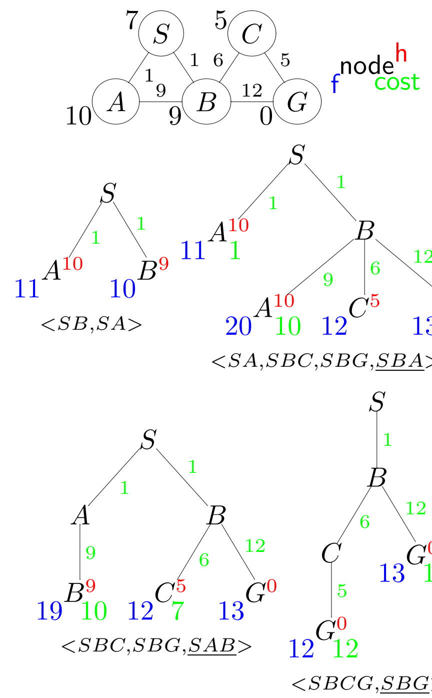
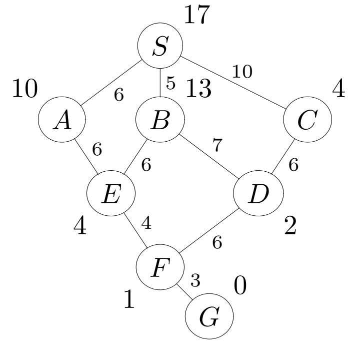
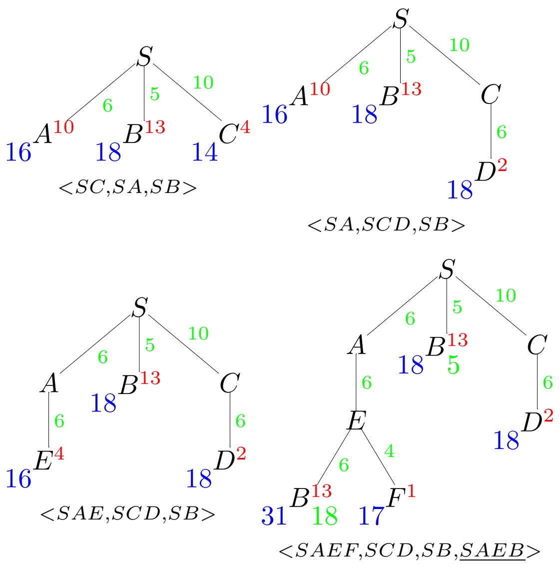
A* example



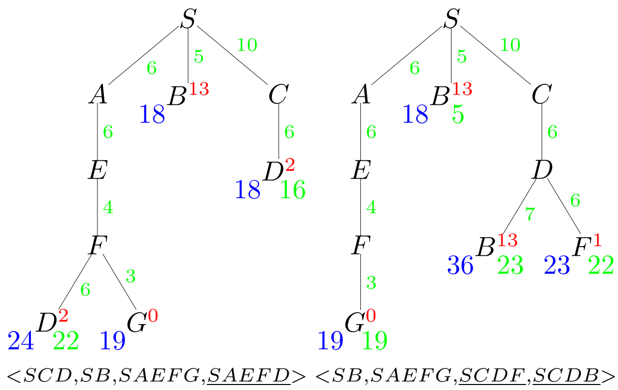
A* (1)



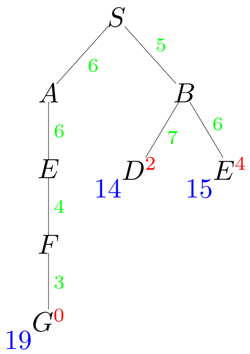
A* (2)

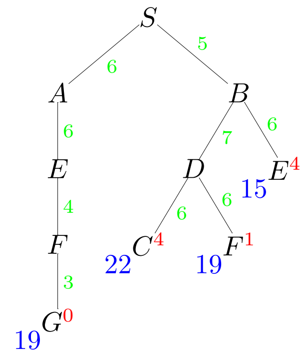


A* (3)



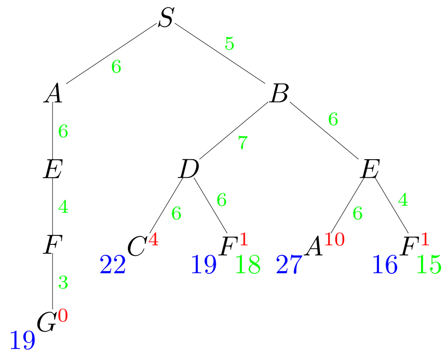
A* (4)





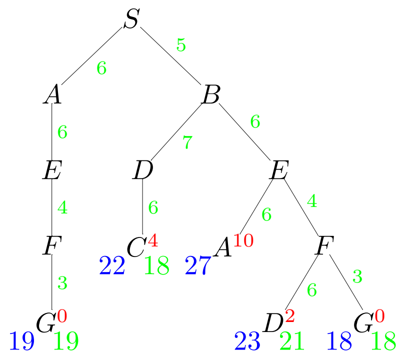
$<SBD,SBE,SAEFG>$ $<SBE,SBDF,SAEFG,SBDC>$

A* (5)



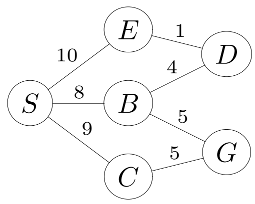
$<SBEF,\underline{SBDF},SAEFG,SBDC,SBEA>$

A* (6)



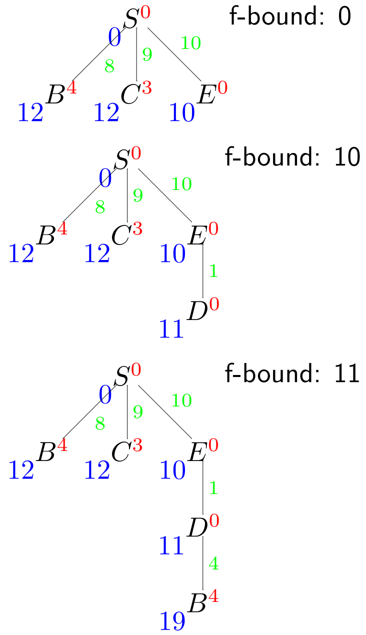
$<SBEFG,\underline{SAEFG},SBDC,\underline{SBEFD},SBEA>$

IDA* (1)

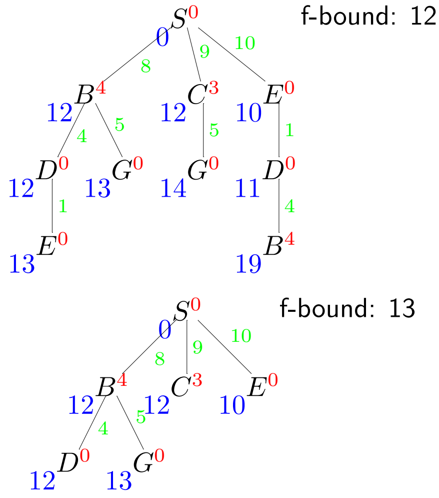


	S	B	C	D	E	G
heuristic	0	4	3	0	0	0

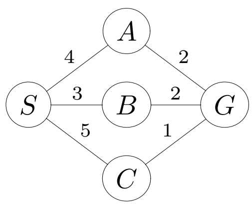
IDA* (2)



IDA* (3)

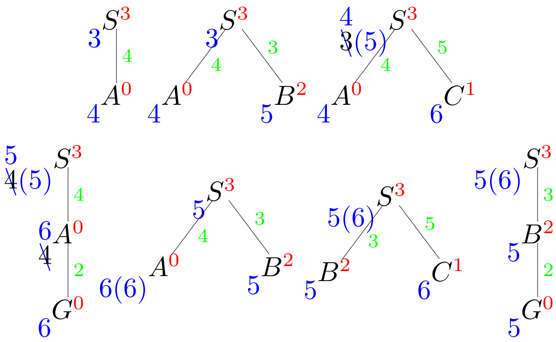


SMA* Example

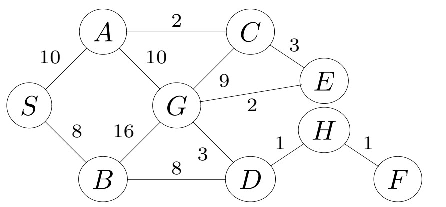


	S	A	B	C	G
heuristic	3	0	2	1	0

with enough memory to hold 3 nodes.



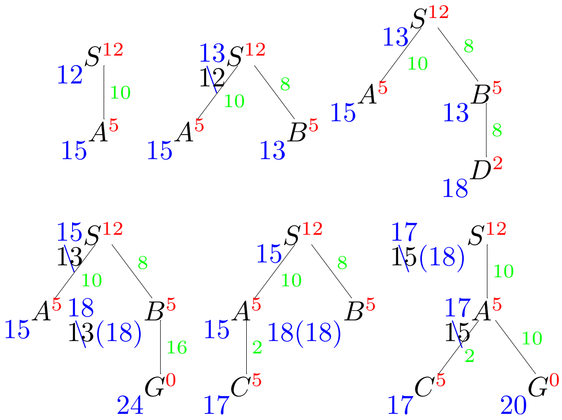
SMA* (1)



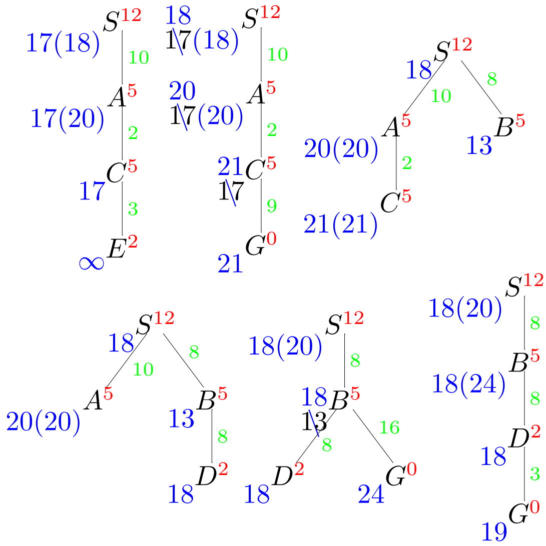
	S	A	B	C	D	E	F	H	G
heuristic	12	5	5	5	2	2	1	1	0

with enough memory to hold 4 nodes.

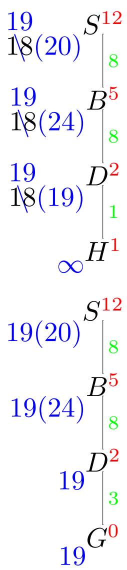
SMA* (2)



SMA* (3)



SMA* (4)



Monotonicity 1

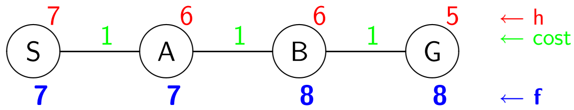
Given:
h satisfies the monotonicity restriction

Proof that f is monotonously non-decreasing.

Proof:

$$\begin{aligned} f(S..A) &= \text{cost}(S..A) + h(A) \\ &\leq \text{cost}(S..A) + h(B) + \text{cost}(AB) \\ &\leq \text{cost}(S..AB) + h(B) \\ &\leq f(S..AB) \end{aligned}$$

Monotonicity 2



f is monotonously non-decreasing, yet h is not an admissable heuristic.

Extra constraint: $h(G) = 0$

$$
\begin{aligned}
f(S..A) \leq f(S..AB) &\leq \ldots \leq f(S..AB..G) \\
&\Updownarrow \\
f(S..A) &\leq f(S..G) \\
h(A) + \underline{\mathrm{cost}(S..A)} &\leq h(G) + \mathrm{cost}(\mathrm{S..G}) \\
&\leq h(G) + \underline{\mathrm{cost}(S..A)} + \mathrm{cost}(A..G) \\
&\Updownarrow \\
h(A) &\leq h(G) + \mathrm{cost}(A..G) \\
&\Updownarrow \quad h(G) = 0 \\
h(A) &\leq \mathrm{cost}(A..G)
\end{aligned}
$$