Algorithm A

If we use Best First search with f(n) = g(n) + h(n),
where

g(n) is the cost from the start to n, and
h(n) is an estimated cost to get from n to goal

we call it "Algoritm A".

We will look at four different sets av estimation of h(n).

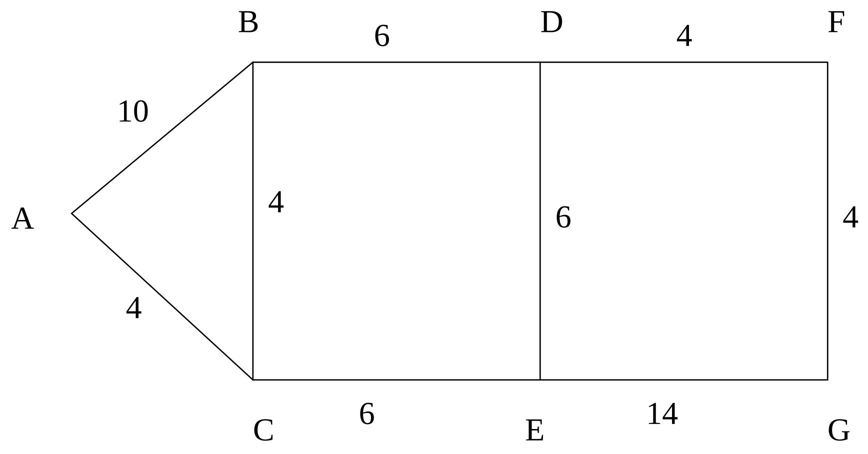
a) Optimistic, but not monotone

b) Not optimistic (and therefore not monotone)

c) All estimates equal to zero (monotone, and therefore optimistic)

d) All estimatimates are perfect (monotone, and therefore optimistic)

We will use the following problem graph

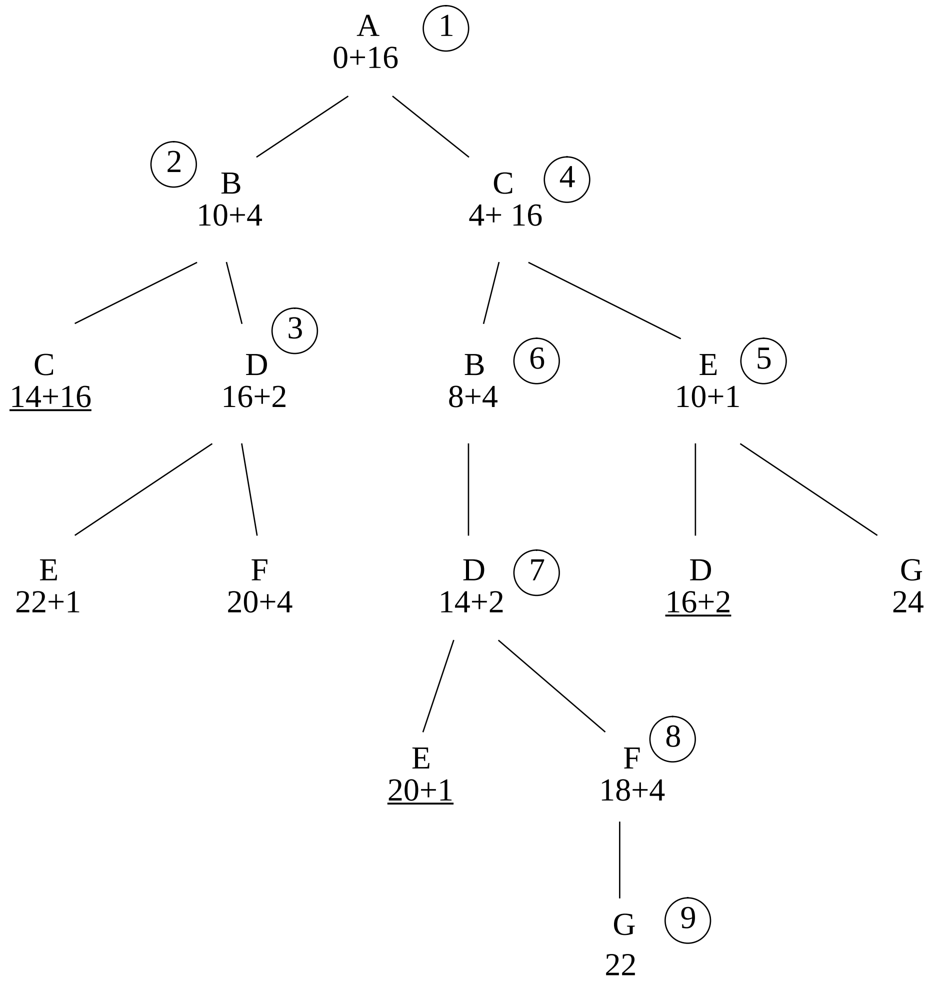


The distances in the picture are the real distances between the nodes.

a) Optimistic, but not monotone

The estimated remaining distances to the goal, G are:

From A	16 (Irrelevant)	From D	2
From B	4	From E	1
From C	16	From F	4



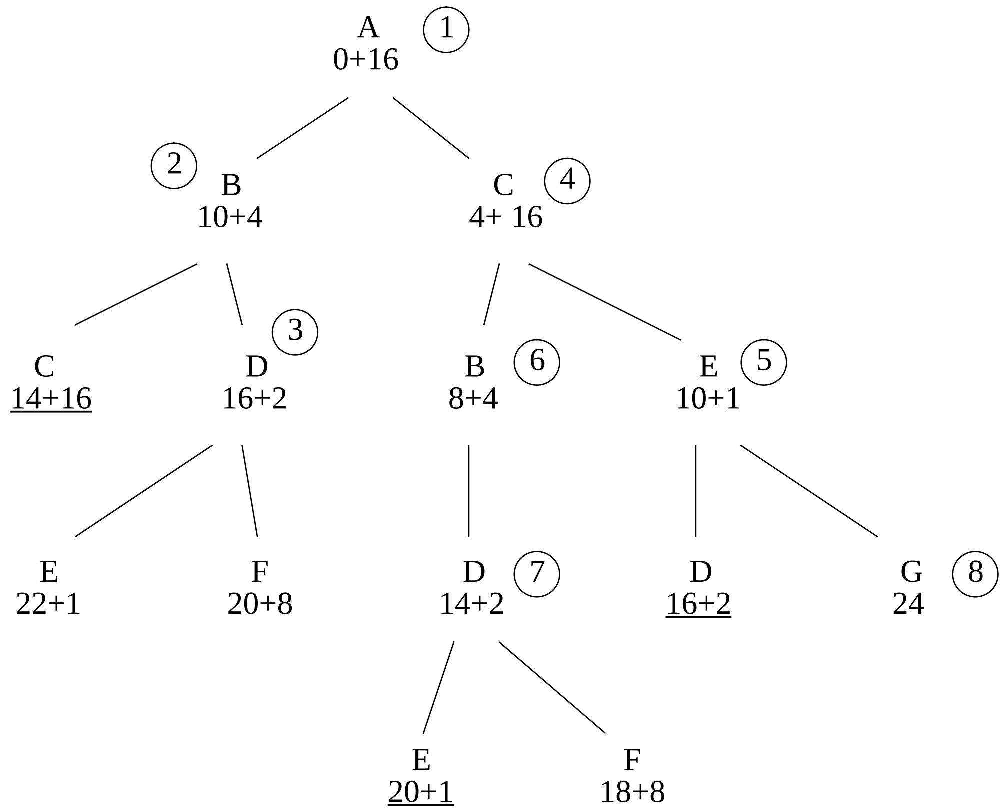
Open	Closed
A16	
B14 C20	A16
D18 C20	A16 B14
C20 E23 F24	A16 B14 D18
E11 B12 F24	A16 C20 D18
B12 F24 G24	A16 C20 E11
D16 F24 G24	A16 B12 C20 E11
F22 G24	A16 B12 C20 D16 E11
G22	A16 B12 C20 D16 E11F2

The estimations are optimistic, so we know that the found path is the best.
The heuristic function, h, is not monotone, however. h(C) = 16, h(B) = 4, and cost(C,B) = 4, so |h(C) - h(B)| > cost(C,B). Therefore we had the first occurence of node B, which was later replaced by a better B.

b) Not optimistic (and therefore not monotone)

If we replace the estimated distance from F to G with 8 we get:

From A	16 (Irrelevant)	From D	2
From B	4	From E	1
From C	16	From F	8

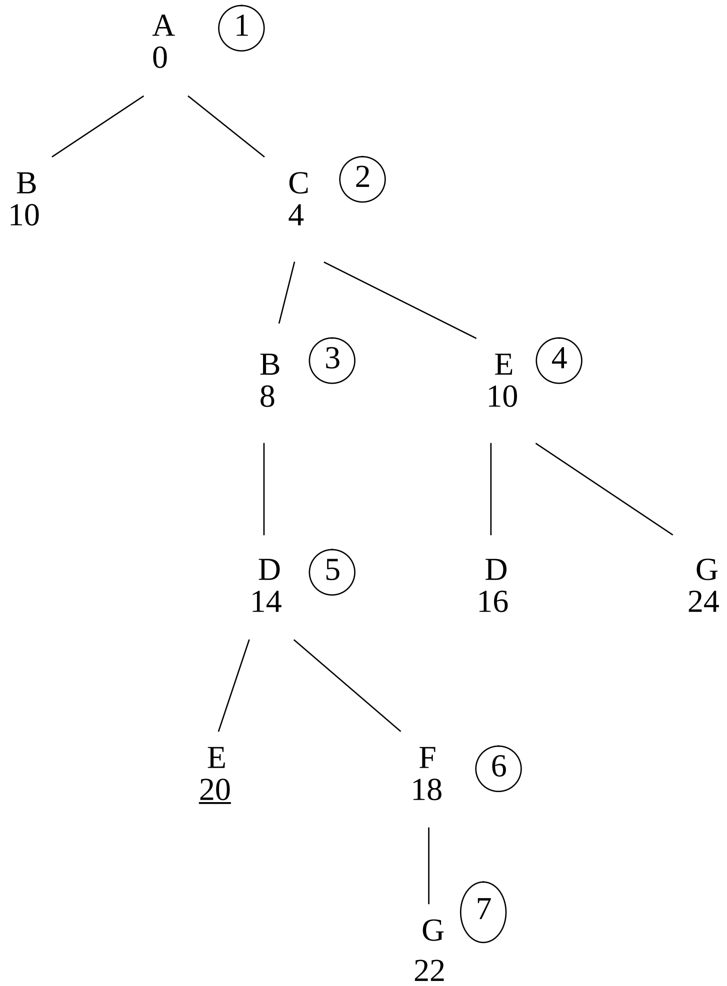


Open	Closed
A16	
B14 C20	A16
D18 C20	A16 B14
C20 E23 F28	A16 B14 D18
E11 B12 F28	A16 C20 D18
B12 G24 F28	A16 C20 E11
D16 G24 F28	A16 B12 C20 E11
G24 F26	A16 B12 C20 D16 E11

Now we have G24 as the current state, so we stop the search. We have found a solution according to method A, but this is not the best one. The big estimate of F hid the best solution.

c) All estimates equal to zero (monotone, and therefore optimistic)

From A	0	From D	0
From B	0	From E	0
From C	0	From F	0



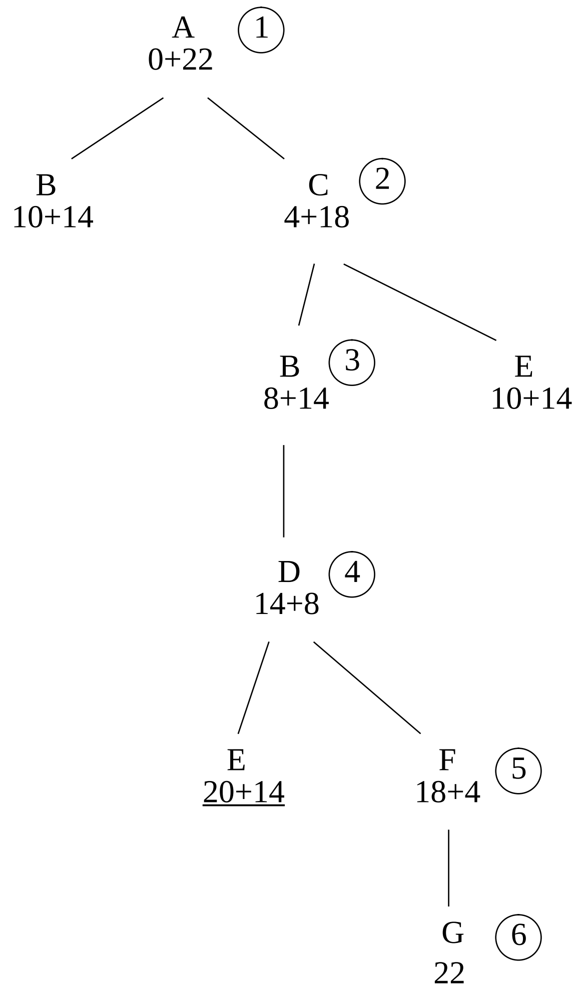
Open	Closed
A0	
C4 B10	A0
B8 E1	A0 C4
E10 D14	A0 C4
D14 G24	A0 C4 B8
F18 G24	A0 C4 B8 D14
G22	A0 C4 B8 D14 F18

This is a kind of breadth first search. We will find the best path, but it might take time.When we find a node, it is via the best path.

d) All estimatimates are perfect (monotone, and therefore optimistic)

The real distances are

From A	22 (Irrelevant)	From D	8
From B	14	From E	14
From C	18	From F	4



Open	Closed
A22	
C22 B24	A22
B22 E24	A22 C24
D22 E24	A22 C24 B22
F22 E24	A22 C24 B22 D22
G22 E24	A22 C24 B22 D22 F22

Now we have G22 as the current state, so we stop the search. We have found the best path in shortest possible time. All nodes we visit have the same f-value.
All h-values are greater than the corresponding h-value in c) (which are all zero), so d) is more informed than c).