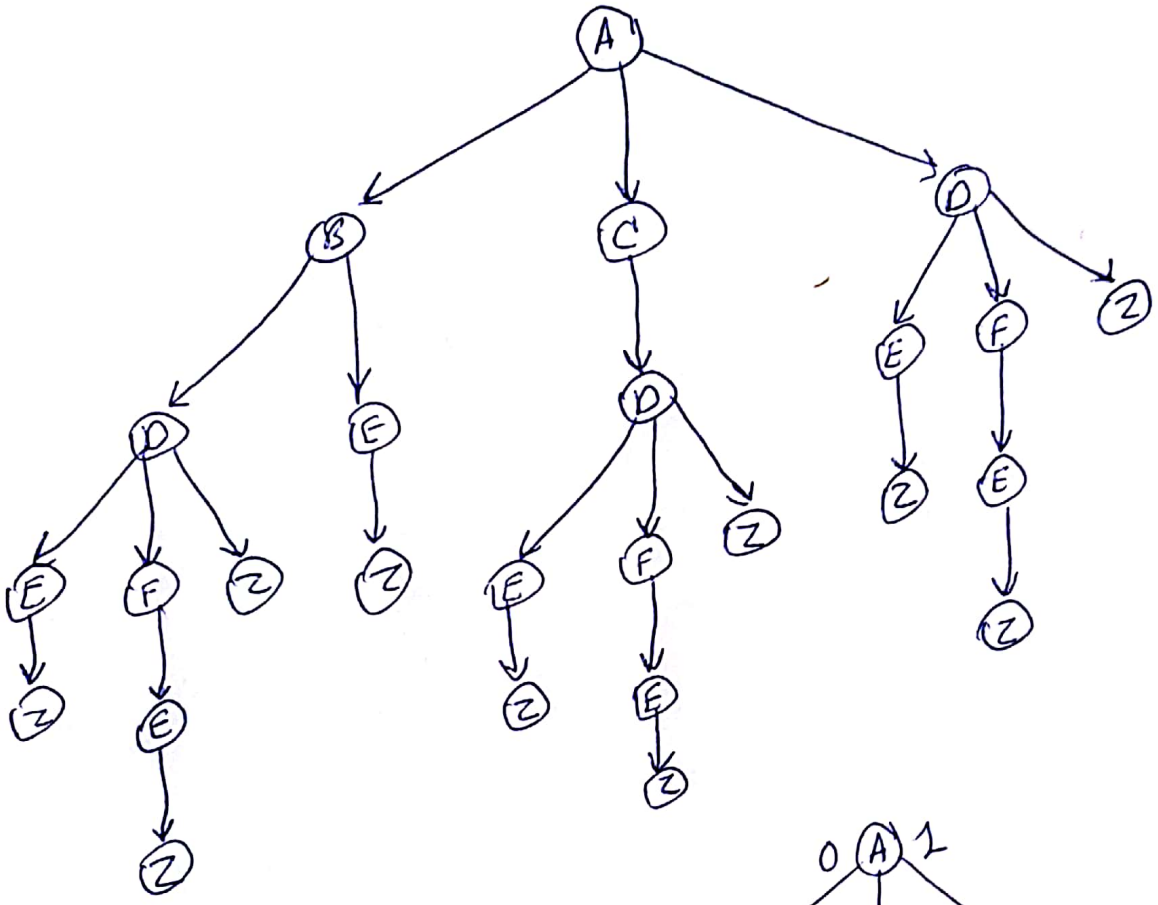
Solutions of HW #1

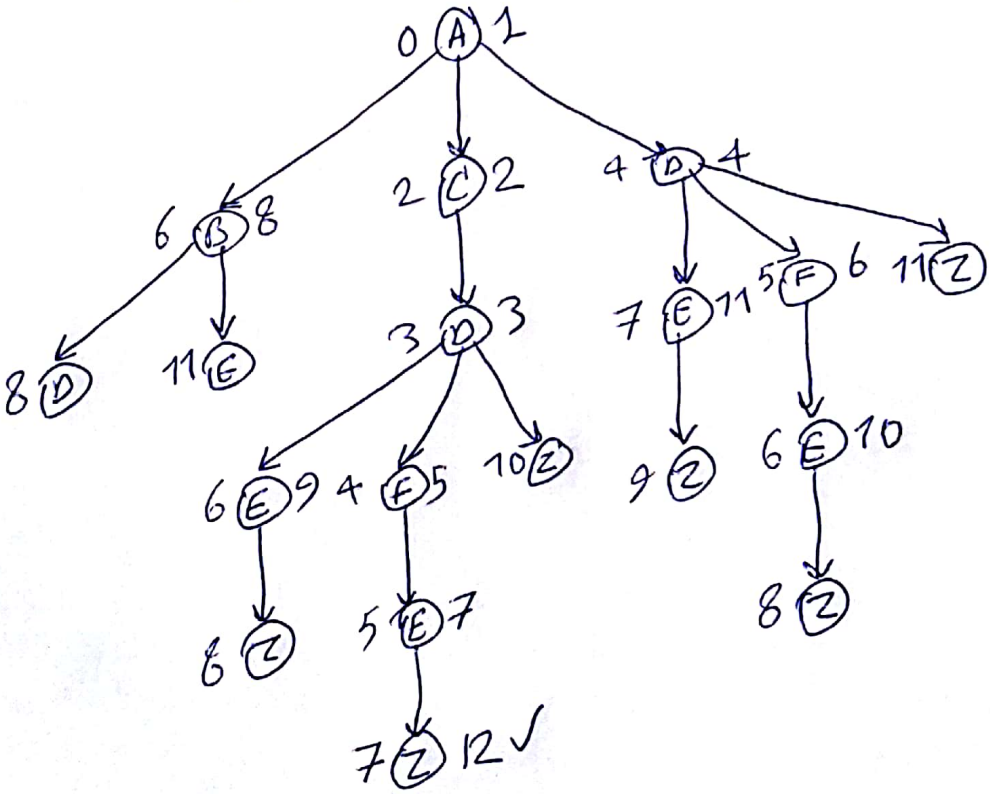
*In all the following solutions, we break a tie by selecting the oldest element in the fringe.

1.

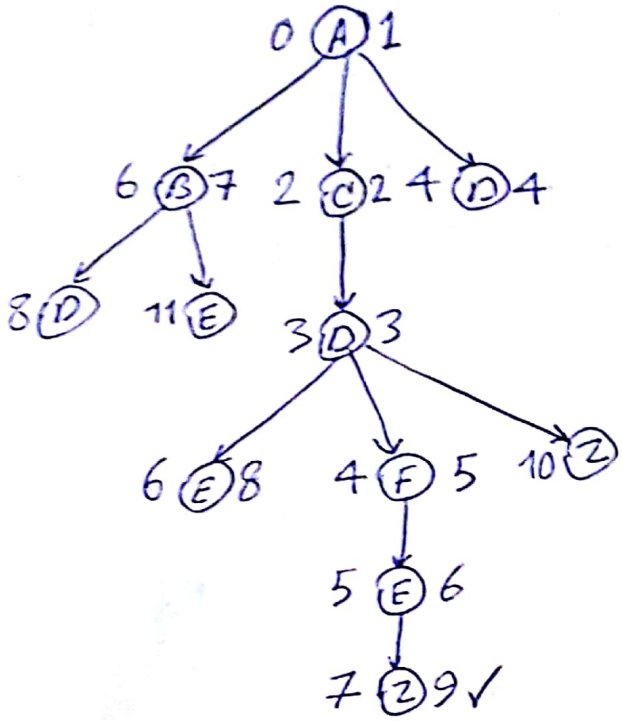


2.

The numbers on the left are the path costs (f(n)) and numbers on the right are the order of expansion.



3.



4. The shortest path from node D to the goal is D-E-F-Z with cost of 4. Then $0 \leq h(D) \leq 4$.

5. The following constraints should be satisfied.

$h(D) \leq c(D,E) + h(E) \Rightarrow h(D) \leq 3+1$

$h(D) \leq c(D,F) + h(F) \Rightarrow h(D) \leq 1+1 \Rightarrow h(D) \leq 2$

$h(D) \leq c(D,Z) + h(Z) \Rightarrow h(D) \leq 7+0$

$\Rightarrow h(D) \leq 2$

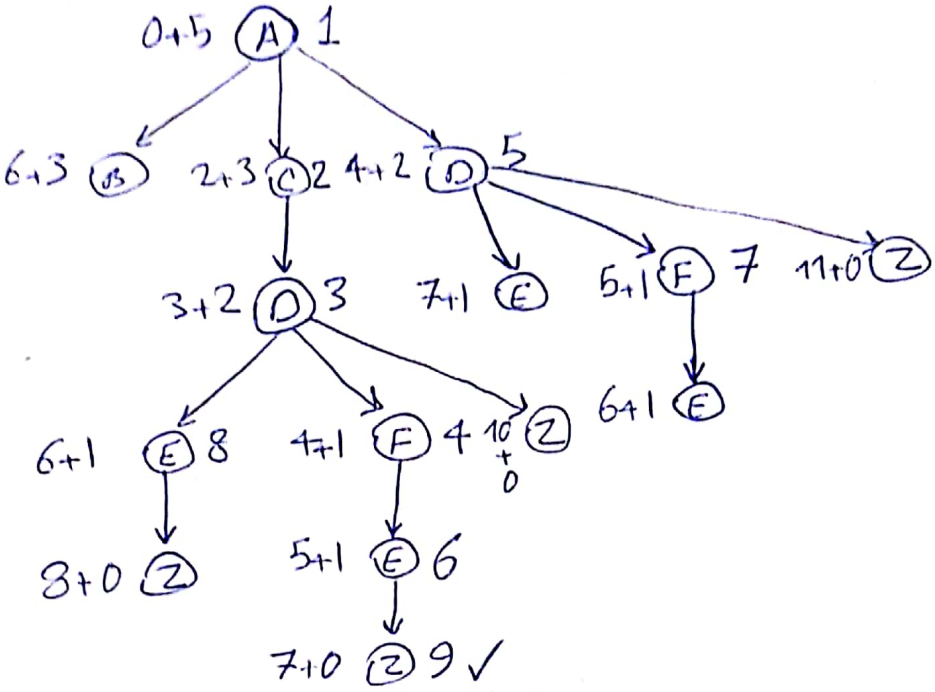
$h(D) \geq h(B) - c(B,D) \Rightarrow h(D) \geq 3-2$

$h(D) \geq h(A) - c(A,D) \Rightarrow h(D) \geq 5-4$ $\Rightarrow h(D) \geq 2$

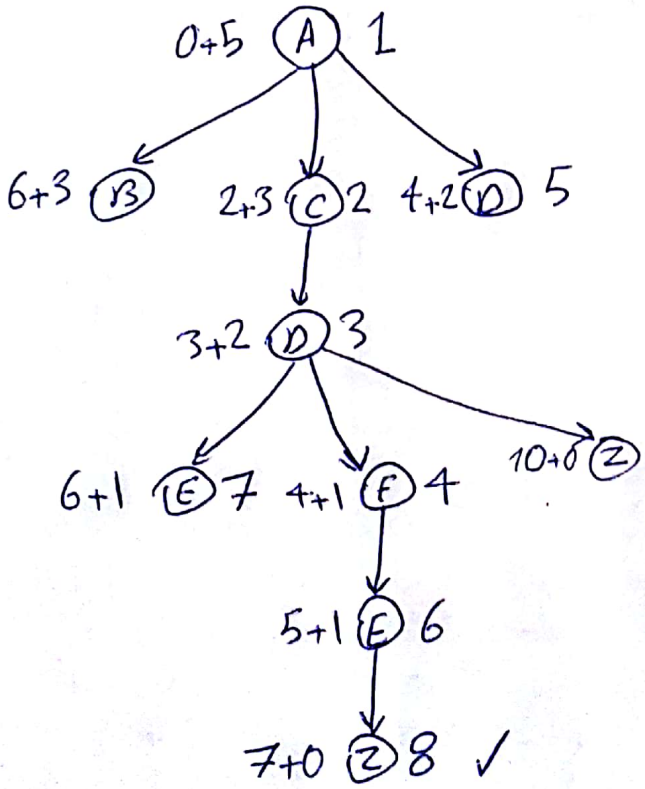
$h(D) \geq h(C) - c(C,D) \Rightarrow h(D) \geq 3-1$

$\Rightarrow \boxed{h(D) = 2}$

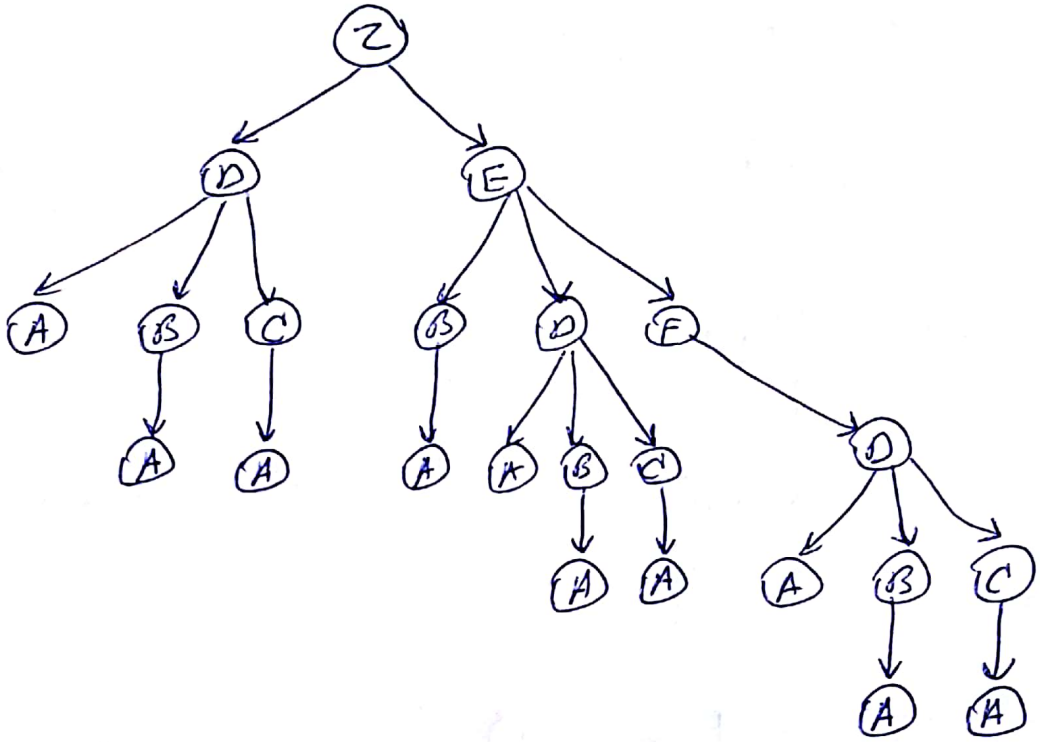
6.



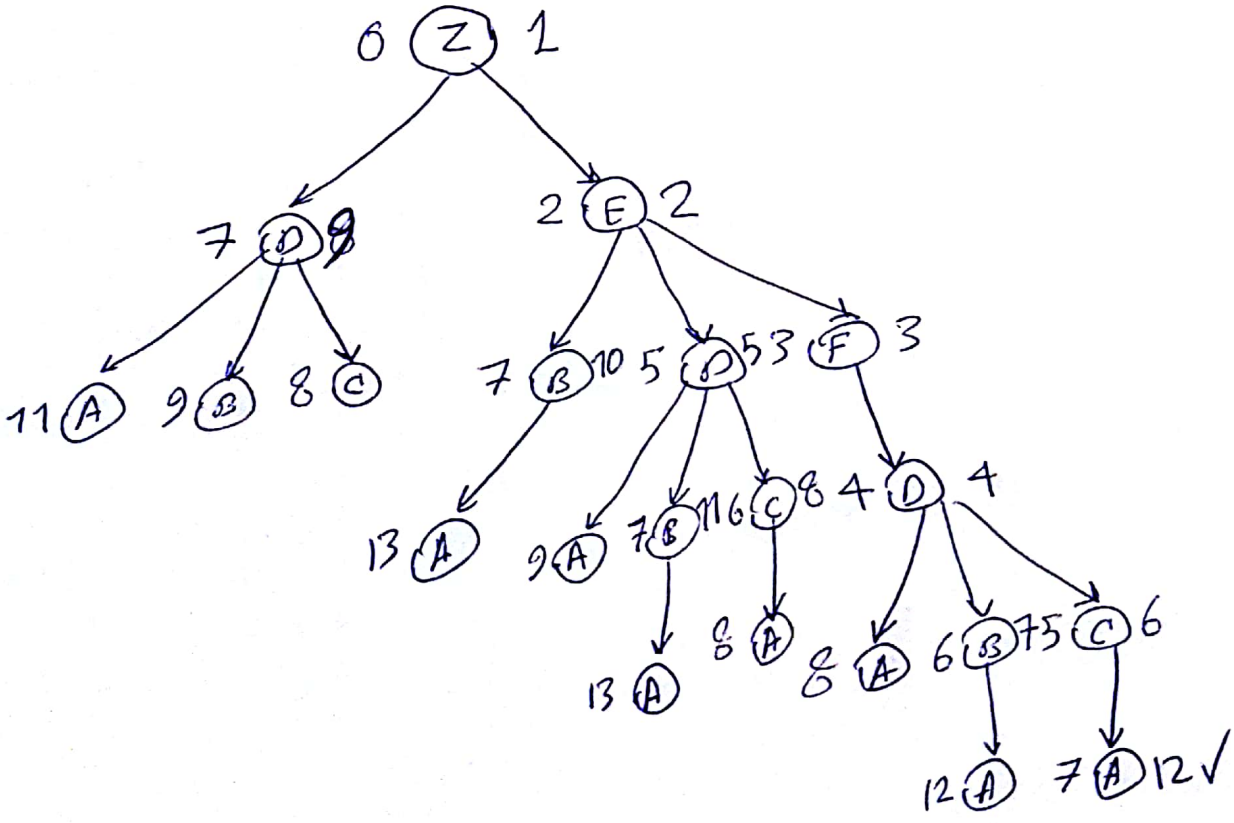
7.



8.

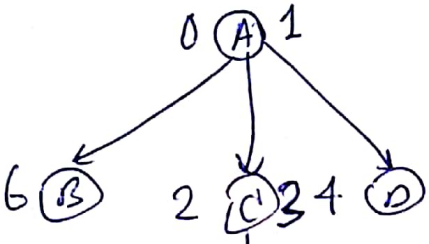


9.

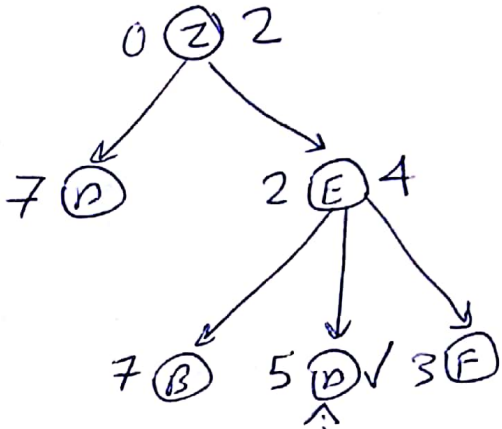


10.

forward search tree



backward search tree



shortest path : A → C → D ... ✓ ... D ← E ← Z