

## Homework 2

Heuristic search mechanisms:

1. The “Best First” search algorithm uses a CLOSE list to detect loops:

- What would be the effect of eliminating this list and use  $g(n)$  instead (the  $g$  component of heuristic function  $f$ )?
- Compare the efficiency of the two methods in terms of time and memory used.

**Answer:**

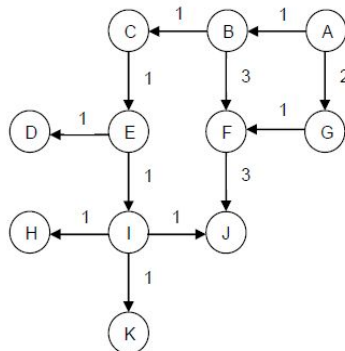
**a)**

If we eliminate the list, we could not know the roads that were visited, to find a new route, where, that is the cost of the sea of lower value, to reach the goal. The node  $g(n)$  only tries to find what is desired, and contains heuristic values, but what we want is to obtain the shortest route.

**b)**

if we use  $g(n)$  improves performance, because we no longer use memory to save the "close" list, we no longer need to save the items in the list.

2. Consider the following graph, where nodes are labelled alphabetically and links have associated costs. As groups discuss and answer the following questions?



List the nodes in open and close lists as well as the current state “X”, for every iteration while searching for J from B, using Best First search. Use the costs in the links as  $g(n)$ , and assume the distance to the goal is the minimum skip distance; that is,  $h(n)$  is the minimum number of links between a node and the goal.

$$f(B) = g(B) + h(B) = 0 + 2 = 2$$

$$f(C) = g(C) + h(C) = 1 + 3 = 4$$

$$f(F) = g(F) + h(F) = 3 + 1 = 4$$

$$f(E) = g(E) + h(E) = 2 + 2 = 4$$

$$f(D) = g(D) + h(D) = 4 + \text{infinito} = \text{infinito}$$

$$f(I) = g(I) + h(I) = 3 + 1 = 4$$

$$f(H) = g(H) + h(H) = 4 + \text{infinito} = \text{infinito}$$

$$f(J) = g(J) + h(J) = 6 + 0 = 6$$

$$f(K) = g(K) + h(K) = 4 + \text{infinito} = \text{infinito}$$

$$\text{Open} = [D^\infty, H^\infty, K^\infty]$$

$$\text{Close} = [B2, C4, E4, F4, I4]$$

X	Open	Close
---	[B2]	[]
B2	[C4, F4]	[B2]
C4	[E4, F4]	[B2, C4]
E4	[F4, I4, D <sup>∞</sup> ]	[B2, C4, E4]
F4	[I4, J6, D <sup>∞</sup> ]	[B2, C4, E4, F4]
I4	[J6, D <sup>∞</sup> , H <sup>∞</sup> , K <sup>∞</sup> ]	[B2, C4, E4, F4, I4]
J6	[D <sup>∞</sup> , H <sup>∞</sup> , K <sup>∞</sup> ]	[B2, C4, E4, F4, I4]