Assignment 2

Q. A* patice assignment.

⇒ $f(N) = g(N) + h(N)$

where, $g(N)$ is actual cost from start node

$h(N)$ is estimate cost from n to Goal node.

$g(A) = 0$ & $h(A) = 8.0$

$\therefore f(A) = g(A) + h(A)$

$= 0 + 8.0$

$= 8.0$

Open list [A]

Close list [ ]

Lowest f-value from open list.

A → B or A → D

$g(B) = g(A) + \text{cost}(A \text{ to } B)$	$g(D) = g(A) + c(A \text{ to } D)$
$= 0 + 2$	$= 0 + 2$
$= 2$	$= 2$
$\therefore h(B) = 7.3$	$\therefore h(D) = 6.0$
$= 2 + 7.3$	$= 2 + 6.0$
$f(B) = 9.3$	$f(D) = 8.0$

We add node 'B' & 'D' to open list & move 'A' as closed.

Open list- [B, D]

Closed list [A]

Lowest f-value from open list

D → E

$g(E) = g(D) + cost(D \text{ to } E)$
$= 2 + 1$
$= 3$
$\therefore h(E) = 5.4$
$= 3 + 5.4$
$f(E) = 8.4$

D → C

$g(C) = g(D) + cost(D \text{ to } C)$
$= 2 + 1$
$= 3$
$\therefore h(C) = 7.6$
$= 3 + 7.6$
$f(C) = 10.6$

We update f-value for E and C & add to open list.
Open list [B, C, E]
Closed list [A, D]

E → F

$g(F) = g(E) + cost(E \text{ to } F)$
$= 3 + 1 = 4$
$\therefore h(F) = 4.1$
$f(F) = g(F) + h(F)$
$= 4 + 4.1$
$= 8.1$

Open list [B, C, F]
Close list [A, D, E]

Lowest f-value from open list which is F

F → G

$g(G) = g(F) + cost[F \text{ to } G]$
$= 4 + 2 = 6$
$\therefore h(G) = 4.1$

$f(G) = g(G) + h(G)$
$= 6 + 4.1$
$= 10.1$

For node C
$g(c) = 3$ (already calc.)
$h(c) = 7.6$
$f(c) = 10.6$

f-value for C remain the same.
$g(c) = 2$ [new g-value.]
open list [B, C, G]
close list [A, D, E, F]

C → H
$g(H) = g(c) + \text{cost}(c \text{ to } H)$
$= 2 + 5 = 7$
$\therefore h(H) = 2.8$
$f(H) = 7 + 2.8$
$= 9.8$
Open list = [B, G, H]
close list = [A, D, E, F, C]

Lowest f-value from list which is H
H → I
$g(I) = g(H) + \text{cost}(H \text{ to } I)$
$= 7 + 2 = 9$
$\therefore h(I) = 2.0$

$h(I) = 9 + 2.0$
$= 11.0$

For node G
$g(G) = 6$ (already cal.)
$\therefore h(G) = 4.1$
$f(G) = 10.1$ (no change).

$\therefore$ Update g-value to lower cost.
$g(G) = 6$
Open list [B, G, I]
Closed list [A, D, E, F, C, H]

lowest f-value from the list
I → K
$g(K) = g(I) + \text{cost}(I \text{ to } K)$
$= 9 + 2.2$
$= 11.2$
$\therefore h(K) = 0.0$
$f(K) = 11.2 + 0.0$
$= 11.2$

Add node 'K' to open list and mark 'I' as closed.
Open list : [B, G, K]
Close list : [A, D, E, F, C, H, I]

$\therefore$ Optimal path =
A → D → E → F → G → K