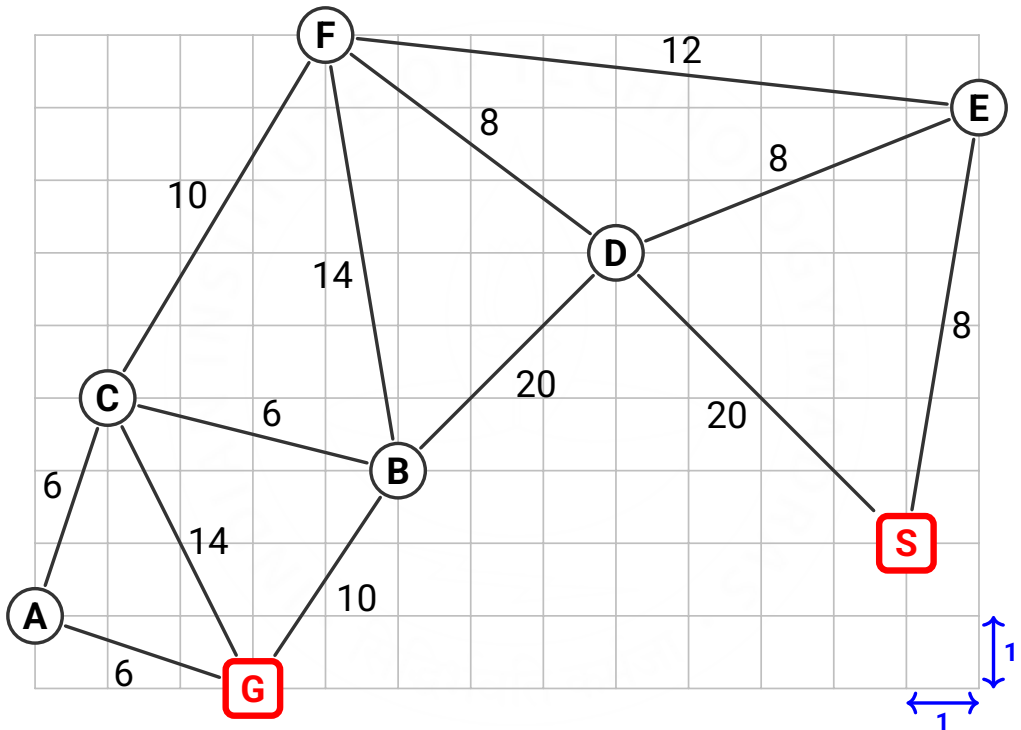# Practice Assignment: City Map Example 2
A* Search
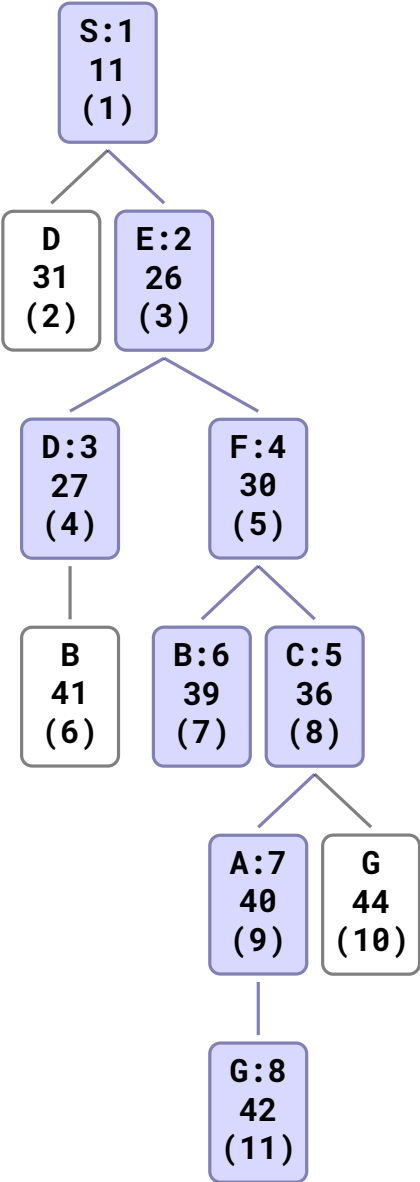
Prepared by S. Baskaran

State Space

MoveGen returns nodes in ALPHABETICAL ORDER.

Search Tree

```
              S:1
              11
              (1)

       D        E:2
       31       26
       (2)      (3)

          D:3        F:4
          27         30
          (4)        (5)

       B        B:6    C:5
       41       39     36
       (6)      (7)    (8)

                   A:7      G
                   40       44
                   (9)      (10)

                G:8
                42
                (11)
```

Solution

OPEN and CLOSED carry tuples: (NODE,PARENT,f,g,h)


```
OPEN       (S,null,11,0,11):[]

CLOSED     []

1.
NODE       S
close      (S,null,11,0,11)
moveGen    D:E:[]
new-open   (D,S,31,20,11)
new-open   (E,S,26,8,18)

OPEN       (E,S,26,8,18):(D,S,31,20,11):[]

CLOSED     (S,null,11,0,11):[]

2.
NODE       E
close      (E,S,26,8,18)
moveGen    D:F:S:[]
pi-open    (D,E,27,16,11)
new-open   (F,E,30,20,10)

OPEN       (D,E,27,16,11):(F,E,30,20,10):[]

CLOSED     (E,S,26,8,18):(S,null,11,0,11):[]

3.
NODE       D
close      (D,E,27,16,11)
moveGen    B:E:F:S:[]
new-open   (B,D,41,36,5)

OPEN       (F,E,30,20,10):(B,D,41,36,5):[]

CLOSED     (D,E,27,16,11):(E,S,26,8,18):
           (S,null,11,0,11):[]

4.
NODE       F
close      (F,E,30,20,10)
moveGen    B:C:D:E:[]
pi-open    (B,F,39,34,5)
new-open   (C,F,36,30,6)

OPEN       (C,F,36,30,6):(B,F,39,34,5):[]

CLOSED     (F,E,30,20,10):(D,E,27,16,11):
           (E,S,26,8,18):(S,null,11,0,11):[]

5.
NODE       C
close      (C,F,36,30,6)
moveGen    A:B:F:G:[]
new-open   (A,C,40,36,4)
new-open   (G,C,44,44,0)

OPEN       (B,F,39,34,5):(A,C,40,36,4):
           (G,C,44,44,0):[]

CLOSED     (C,F,36,30,6):(F,E,30,20,10):
           (D,E,27,16,11):(E,S,26,8,18):
           (S,null,11,0,11):[]

6.
NODE       B
close      (B,F,39,34,5)
moveGen    C:D:F:G:[]

OPEN       (A,C,40,36,4):(G,C,44,44,0):[]

CLOSED     (B,F,39,34,5):(C,F,36,30,6):
           (F,E,30,20,10):(D,E,27,16,11):
           (E,S,26,8,18):(S,null,11,0,11):[]

7.
NODE       A
close      (A,C,40,36,4)
moveGen    C:G:[]
pi-open    (G,A,42,42,0)

OPEN       (G,A,42,42,0):[]

CLOSED     (A,C,40,36,4):(B,F,39,34,5):
           (C,F,36,30,6):(F,E,30,20,10):
           (D,E,27,16,11):(E,S,26,8,18):
           (S,null,11,0,11):[]

8.
NODE       G
close      (G,A,42,42,0)
GOAL       G

OPEN       []

CLOSED     (G,A,42,42,0):(A,C,40,36,4):
           (B,F,39,34,5):(C,F,36,30,6):
           (F,E,30,20,10):(D,E,27,16,11):
           (E,S,26,8,18):(S,null,11,0,11):[]

PATH       S:E:F:C:A:G:[]

PATH COST  42
```