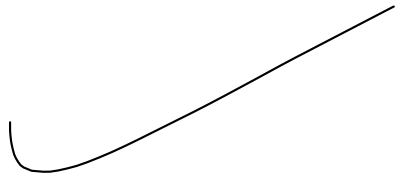
#2c: $T(n) = T(n-2) + 3$

$T(1) = 1$

$T(0) = 1$

n	0	1	2	3	4	5	6	7	8	9	
T(n)	1	1	4	4	7	7					

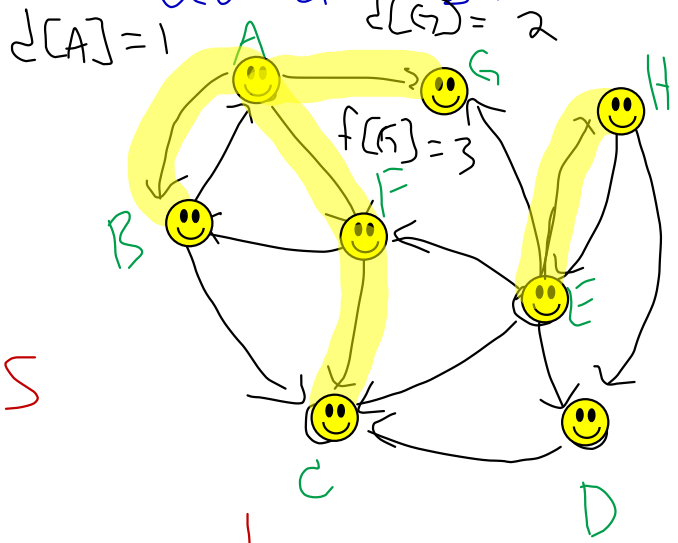
$T(2) = T(0) + 3 = 1 + 3 = 4$



Depth first Search

DFS builds a forest.

Same as BFS, except we use a stack instead of a queue.



Dump

~~H~~
~~E~~
~~D~~
~~C~~
~~G~~
~~F~~
~~B~~
~~A~~

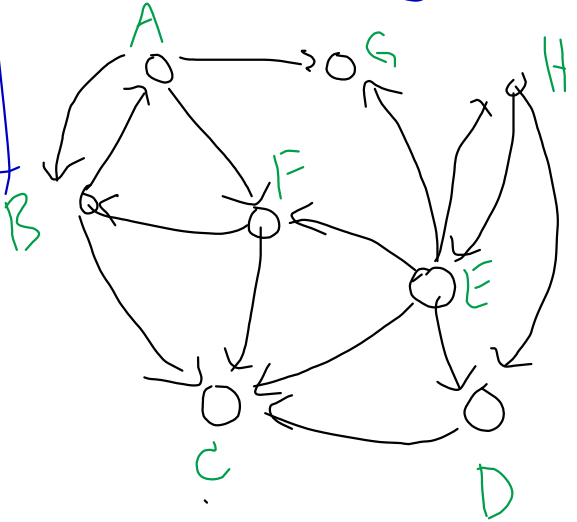
Rough DFS

- {Select any vertex, A
- push A onto a stack S
- At each step,
  - Pop an element, V, from stack
  - push its ~~unvisited~~ neighbors on stack} unstacked.
- loop until all vertices have been visited

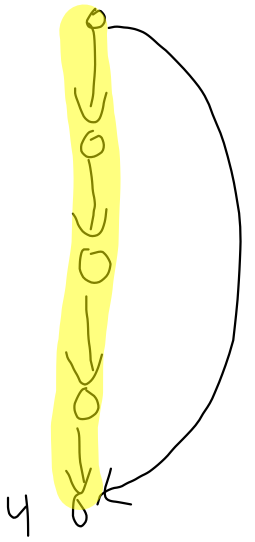
```
DFS(G)
for each vertex v in G
    color[v] ← white

time ← 0
for each vertex v in G
    if color[v] = white
        then DFS-VISIT(G, v)
```

white = unvisited
gray = active
black = done.

d[v] = discovery time
f[v] = finishing time.

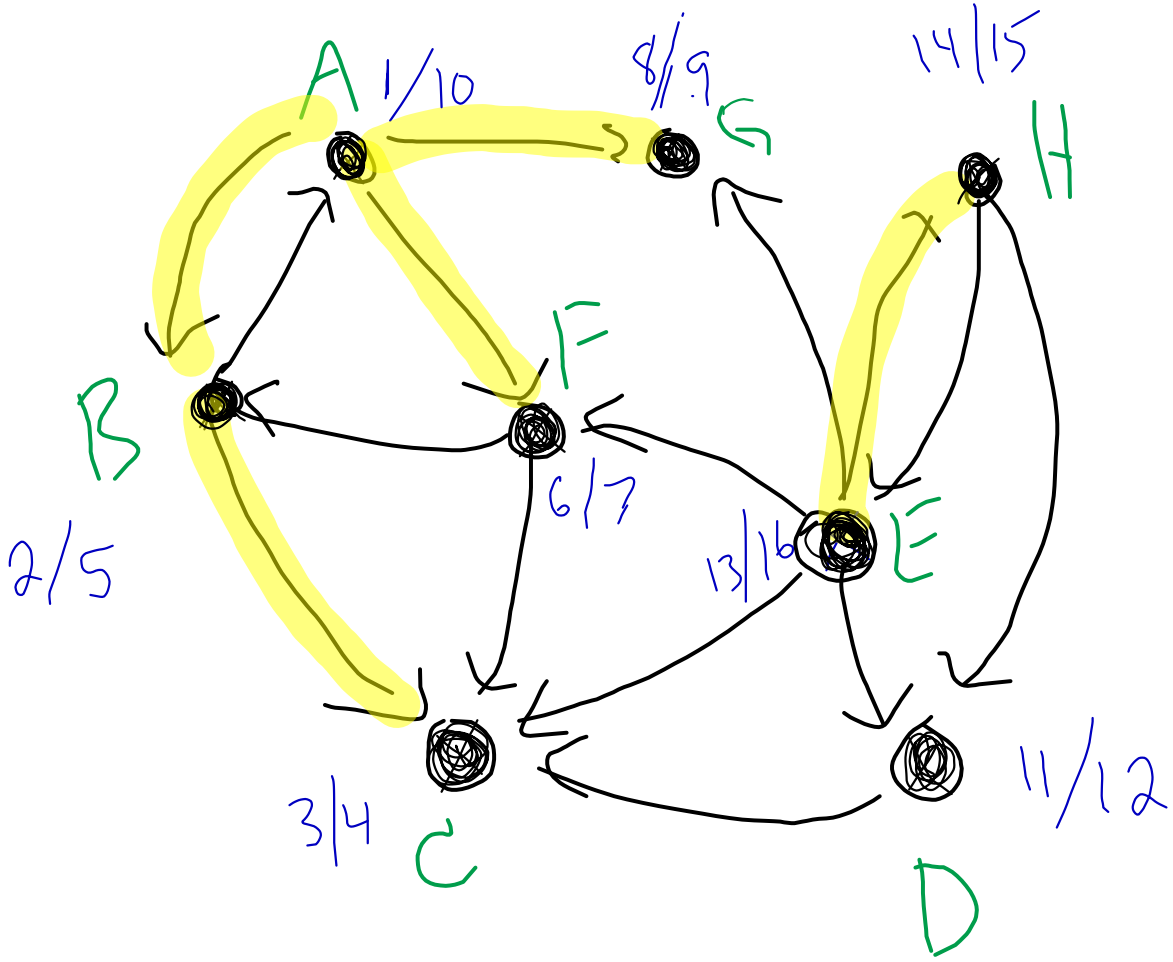



```
DFS-VISIT(G, v)
    color[v] ← grey
    d[v] ← time ← time + 1
    for each w ∈ Adj[v]
        If color[w] = white
            π(w) = v
            DFS-VISIT(G, w)
    color[v] ← black
    f[v] ← time ← time + 1
```



discovery/finish

List neighbors/vertices alphally

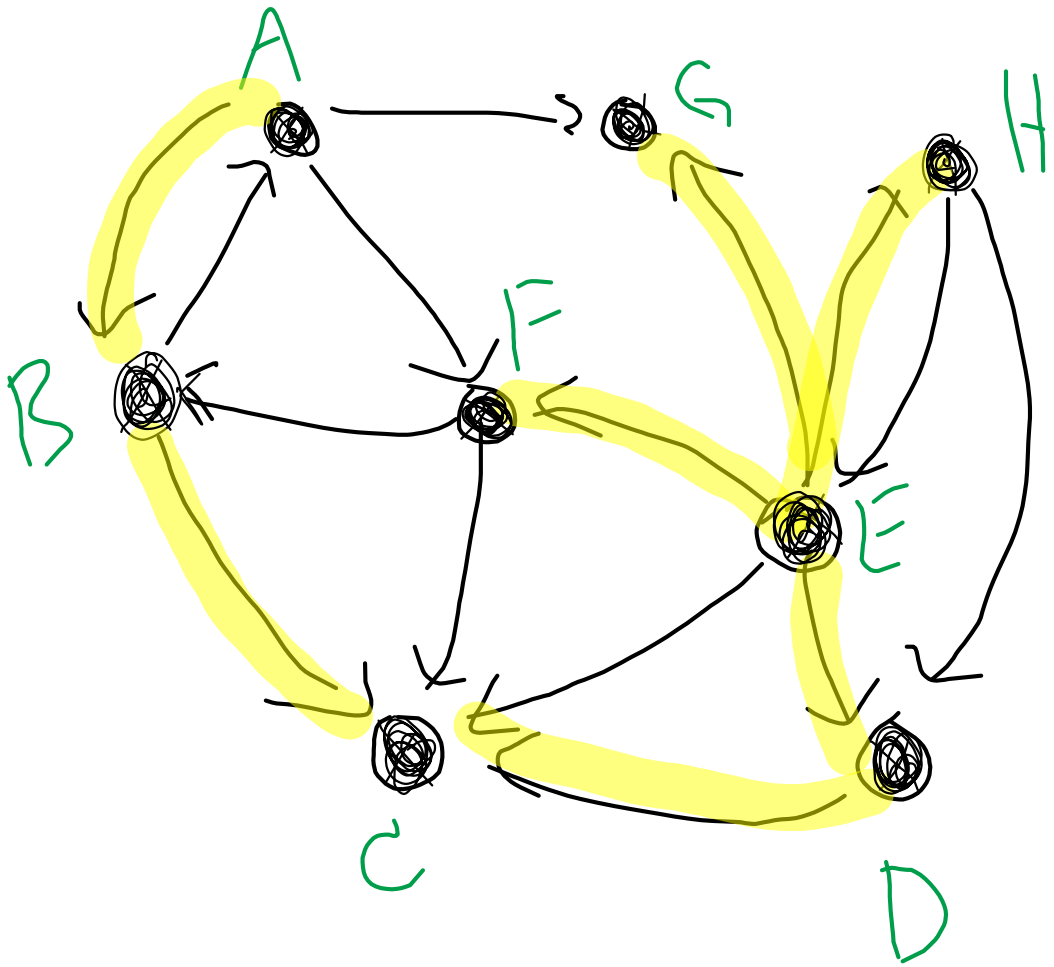


○ = white

⊗ = grey

● = black

Suppose G is undirected. (Ignore arrows)



Suppose G ~~has~~ is directed has no cycles.

Show that if 

is an arc in G, then $f[v] < f[u]$.

Homework.