Depth First Search

- Input: $G(V,E)$
- Output: $d[v]$ & $f[v]$
  - $\downarrow$ discovery times
  - $\hookrightarrow$ finishing times

- Timestamps start at 1 & end at $2|V|$
- $1 \leq d[v] \leq f[v] \leq 2|V|$

→ başla

$d[v] = [1,2,3,4,6,10,12,15]$
$f[v] = [5,7,8,9,11,13,14,16]$

do this until every node is
→ finished node

descendants
$1 \nearrow \uparrow \quad 12$
$[() \{\}]$
$\downarrow 56$
parent node

Forward: ancestor → desc
but doesn't have a child

not in same tree with 1/14

- If we have a back edge the graph is a cycle.

traverse e divenler tree $(1|12) \to (5|6)$

ex4
$u \qquad v$
$(1,4) \qquad (5,6)$
$\downarrow \qquad \downarrow$
not in same DFS tree

→ çocuğu yoksa bitir

çocuğu yok
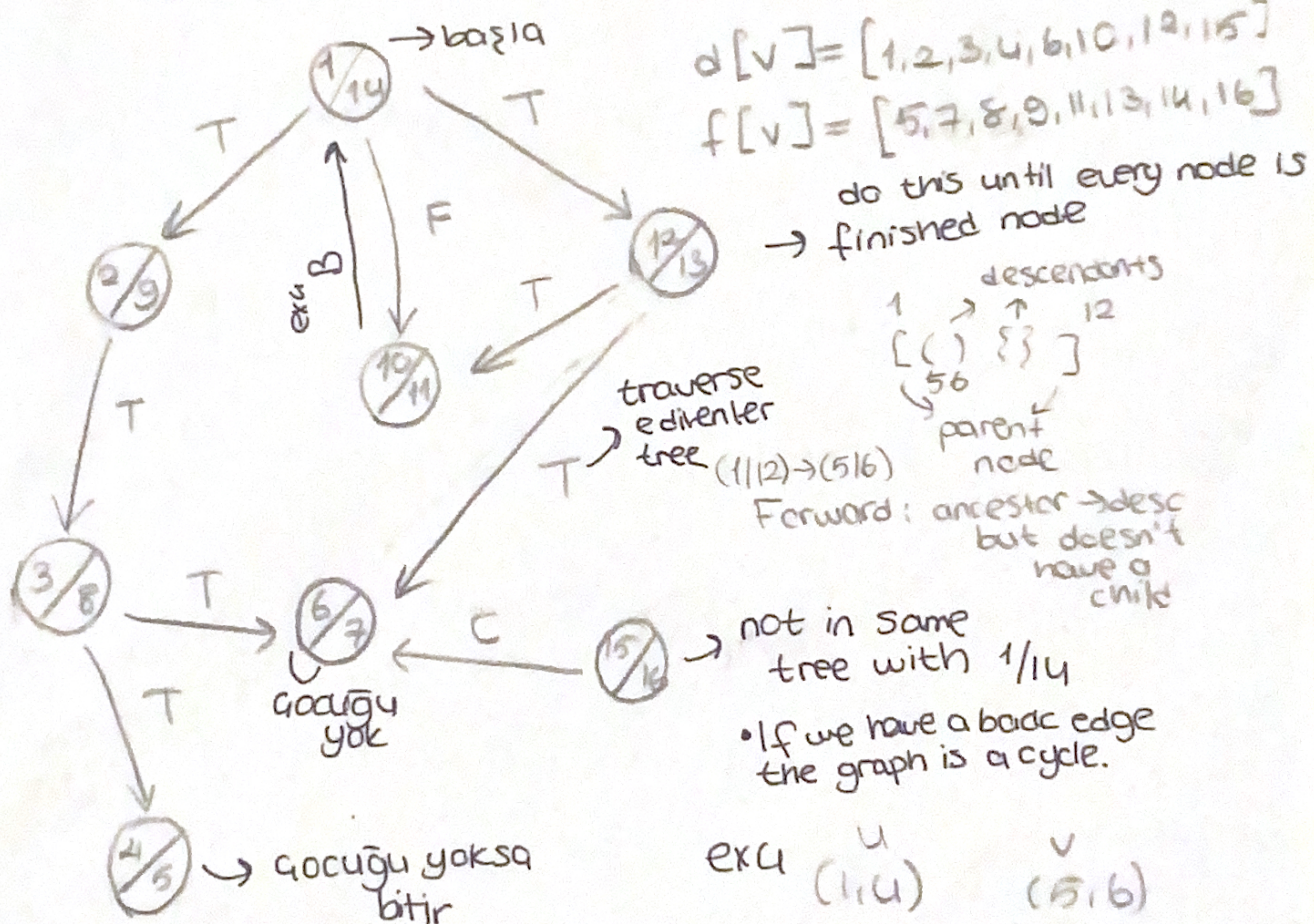
Parenthesis Theorem

for u & v nodes, if:

- $d[u] < f[u] \; \mathbf{<} \; d[v] < f[v] \; \mathbf{<} \; d[u] < f[u] \to u \,\&\, v$ are not descendants of each other. (they're in different trees)

(or)

- $d[u] < d[v] < f[v] < f[u]$ (or vice versa) v is a child of u.
  u is a child of v.

ex4
u (1,12)
v (2,7) → $d[u] \quad d[v] \quad f[v] < f[u]$
$1 \; < \; 2 \; < \; 7 \; < \; 12$
$\hookrightarrow$ v is a child of u