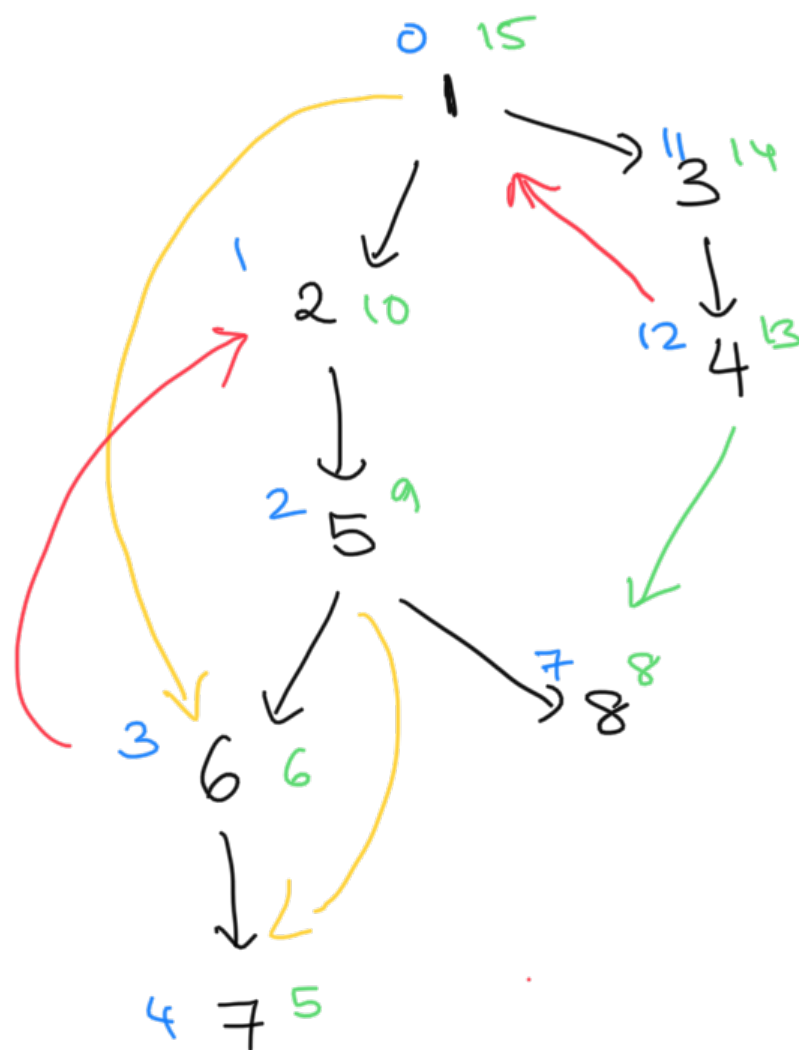
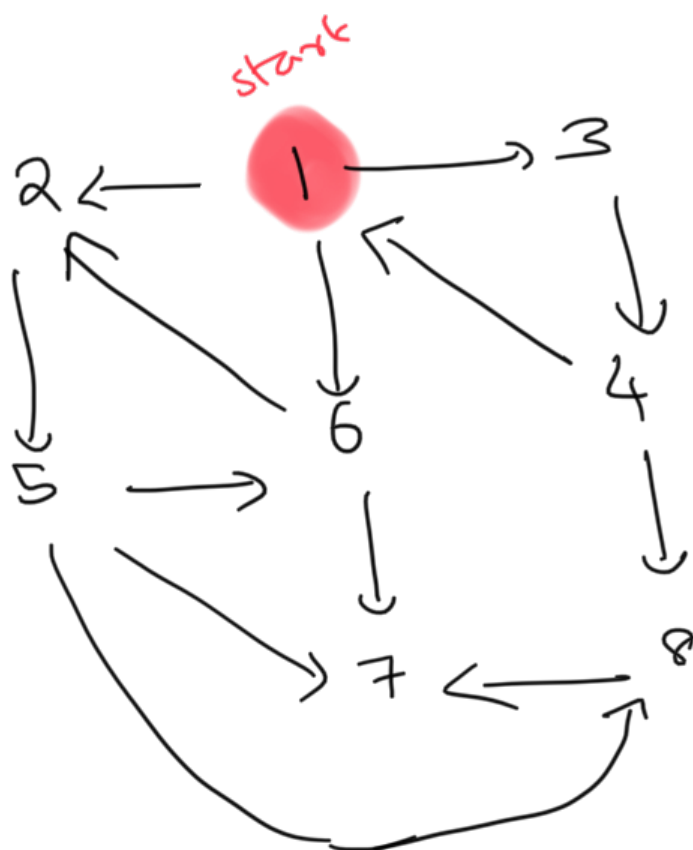


DFS numbering for directed graphs

pre number
post number



direct cycle
↺

red edges = back edges

Black edges = DFS tree
with pre, post
numbers.

green edges = cross edges

yellow edges = non-tree
forward edges

[higher pre DFS → lower
pre DFS] ...
↗

Classifying edges

① Tree edges /

Forward edges

begin exploring u
begin exploring v
finish v
finish u .

:

$[pre(u), post(u)]$

u

$[pre(v), post(v)]$



② Back edge

\hookrightarrow converse



$[pre(v), post(v)]$

u

$[pre(u), post(u)]$

③ Cross edges :

start v
Finish processing v
then start u ,
then finish u



$[pre(v), post(v)]$

$\cap [pre(u), post(u)]$
 $= \emptyset$