HW - due 12/5 / Mon midnight

1. a graphic matroid ch 16.4 MSTP

$G = (V, E)$
an undirected graph

$M_G = (S, I)$ where

$S = E$ a subset of E called $x \in I$ iff x is acyclic
$I \subseteq 2^S$

prove that this definition ①② 16.4

Answer)

16.4 Graphic matroid - MSTP

Def) Given an undirected graph $G = (V, E)$

$M_G = (S, I)$

$S = E$

a Subset of E called x $\in I$ iff x is acyclic

Def of matroid $M = (S, I)$

① S : a finite set $\neq \emptyset$

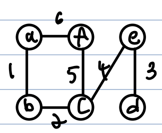
② $I \subset 2^S$ such that

2-1) if $x \in I$ then all subset of x $\in I$

2-2) if $x, y \in I$ such that $|x| > |y|$ then $\exists a \in x - y$ such that $(\{a\} \cup y) \in I$

2-1) prove $x = \{\ \}$ is a subset of edge which is acyclic
so subset of x can not make a cycle

2-2)



$G = (V, E)$
$V = \{a, b, .., e, f\}$
$E = \{1, 2, .., 5, 6\}$

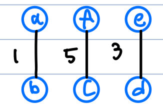
1. $S = E = \{1, 2, .., 6\}$
$I = \{\emptyset, \{1, 2, 5\},$
$\{1, 5, 3, 4\},$
$\{2, 5, 3\}, \{4, 3\}\}$

$x = \{1, 5, 3\}$
$y = \{2, 5\}$

Define New graphs using x, y

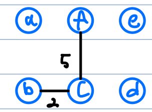
$\exists_z \in x - y$ $\{z\} \cup y \in I$
$\{1\}$

$G_x = (V, x)$



a forest

$G_y = (V, y)$

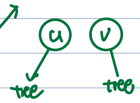


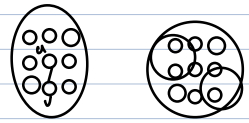
a forest

observation : # of trees in $G_x = 3$

# of trees in $G_y = 4$

1개 this there must be (u, v)





G_x G_y

$(u, v) \in$ tree1

1. $x, y \in I$ $|x| > |y|$
2. G_x, G_y
3. u, v | $u, v \to$ tree

tree

Y의 수트리에 연결되어 있지 않은 u, v가 존재.

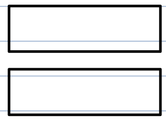
$Y \cup \{u, v\} \in I$

ch 22.3

Stack

2. DFS (G, s)

Adj ( )



Give an implementation of DFS (G, s) that uses a stack explicitly. Your code should consist of 2 parts:

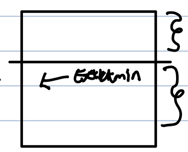
(1) initialization

(2) an iterative parts that explicitly uses push and pop operations.

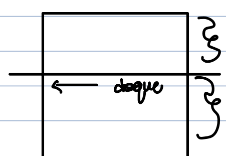
Answer

```
DFS (G, s)
for each v ∈ V[G]
    visited (v) ← false (white)        } peperation
S ← ∅
--------------------------------------
push (S, s)
while (S ≠ ∅)
    u ← pop (S)
    if visited (u) == false ten
        visited (u) ← true
        for each w ∈ Adj [u]
            if visted (w) == false then
                [push (S, w)]
```

prim's Alg



BFS



Dijkstra's Alg

for i = 1 to n-1 do

select