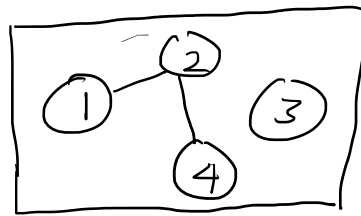
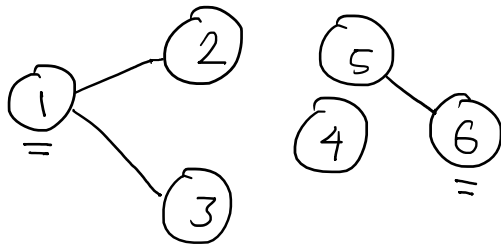


# Keep Graph Disconnected

Saturday, September 17, 2022 9:11 PM



1 and 4 connected  
1 and 3 connected

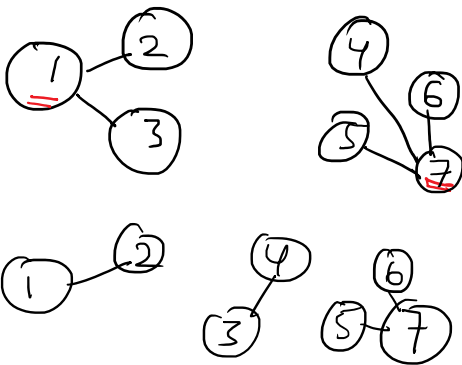


Lose if not good graph

- connect 1 and N
- make self-loop, multi-edge

Game Theory → Dynamic Programming  
→ Observasi proofing

connect node not 1 or N



edge we can create is even → 1 lose  
—— 11 —— is odd → 2 lose

Assume component size of 1 and N  $x$  and  $N-x$

$$x \rightarrow \binom{x}{2} = \frac{x(x-1)}{2}$$

$$N-x \rightarrow \frac{(N-x)(N-x-1)}{2}$$

$$\left[ \frac{x(x-1)}{2} + \frac{(N-x)(N-x-1)}{2} - M \right]$$

even or odd

N odd

→  $x$  even  $N-x$  odd  
 $x$  odd  $N-x$  even

$N=5$   
 $x=2$   $N-x=3$   
 $x=3$   $N-x=2$

$$\rightarrow \frac{x(x-1)}{2} + \frac{(N-x)(N-x-1)}{2} - M$$

$x(N-x) \Rightarrow$  always even

N even → Intuisi

$$\frac{N(N-1)}{2} - x(N-x) - M \Rightarrow \text{odd}$$

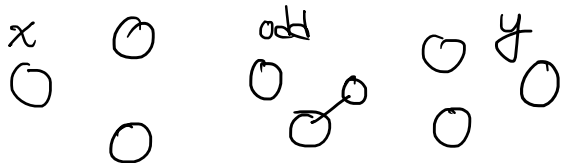
2

$\Rightarrow$  even

parity size component,  $(x, y)$

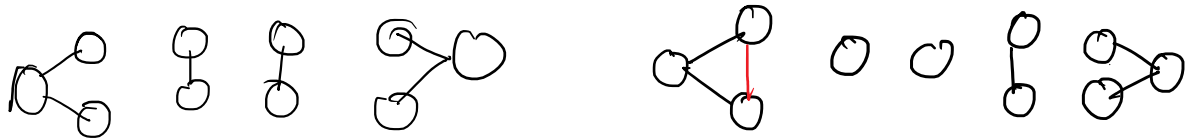
$x$  and  $y$  diff parity

$\boxed{\rightarrow} \frac{N(N-1)}{2} - xy - M \longrightarrow xy \text{ even}$   
 $\hookrightarrow$  change parity such that he will win



$xy = \text{odd}$   
 $N \text{ even} \rightarrow N - x - y = \text{odd}$

$\rightarrow \frac{N(N-1)}{2} - xy - M$   
 $\swarrow$  odd  $\rightarrow$  first person always win  
 $\searrow$  even  $\rightarrow$  second person



$\rightarrow N \text{ odd/ganjil} \Rightarrow \frac{N(N-1)}{2} - x(N-x) - M$   
 $x=1$   
 $\swarrow$  odd = 1 menang  
 $\searrow$  even = 2 menang

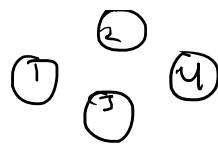
$\rightarrow N \text{ genap} \Rightarrow (x, y) \Rightarrow$  size dari component 1 dan  $N$

$\hookrightarrow x$  dan  $y$  different parity  $\rightarrow$  1 selalu menang

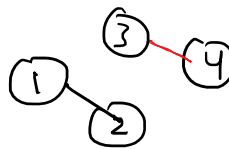
$\hookrightarrow x$  dan  $y$  same parity

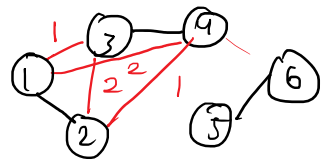
$\frac{N(N-1)}{2} - xy - M \rightarrow$   
 $\swarrow$  odd = 1 menang  
 $\searrow$  even = 2 menang

DSU  $\Rightarrow (x, y)$  }  $O(N+M)$  /  $O(N+M \log N)$   
 $\hookrightarrow$  DFS


 $\rightarrow$  1 menang  $x=1, y=1$   

$$\frac{N(N-1)}{2} - xy - M = 6 - 1 - 0 = 5$$


 $\rightarrow$  1 menang  $x=2, y=1$


 $\rightarrow$  ~~lose~~ 2 menang  $x=2, y=2$   

$$\frac{N(N-1)}{2} - xy - M = 15 - 4 - 3 = 8 \text{ even/}$$

$\hookrightarrow$  Brute Force Code

$N! \rightarrow 2^{N(N-1)/2}$

$\rightarrow dp(x, y, cnt_0, cnt_1)$   
 $x, y \Rightarrow 1 \text{ dan } N$   
 $cnt_0, cnt_1 \Rightarrow \text{banyaknya component size ganjil \& genap}$

Parsial  $\begin{cases} \text{dapat poin} \\ \text{Cek solusi} \end{cases}$