CS & IT ENGINEERING

GRAPH THEORY

Chromatic Number and Independent set

Lecture No.9

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01 Properly coloring

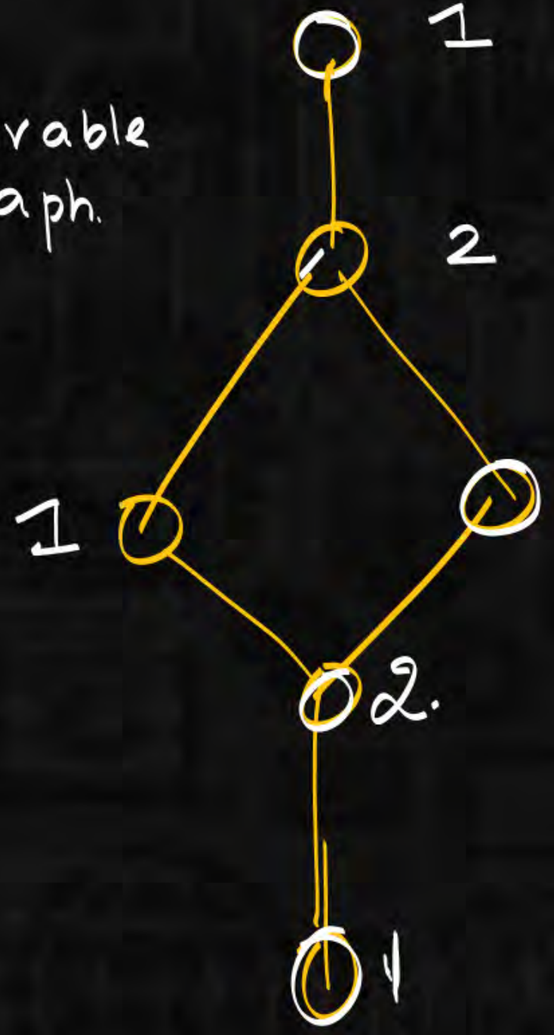
02 Chromatic number

03 Chromatic Number in Graphs

04 ~~Subgraphs~~ / Independent set

05 ~~Graph operations~~ / MIS

2-colorable Graph.



$X(G) = 2$.

$X(G) = k$
K-colorable Graph.

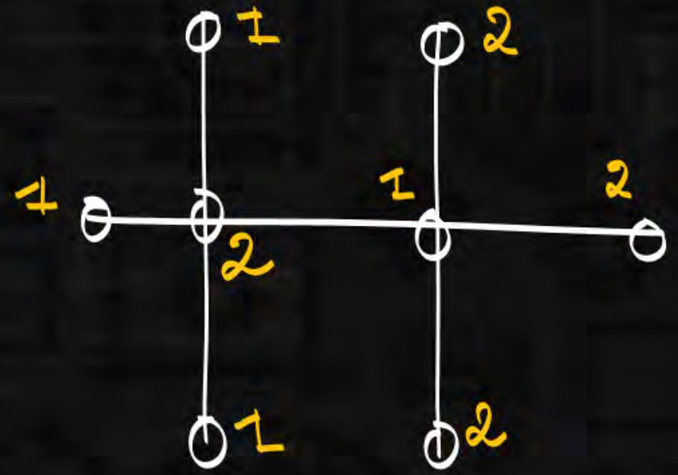
Chromatic no $(X(G))$

3) min no of colors
+
{adjacent should not
.. have same clr

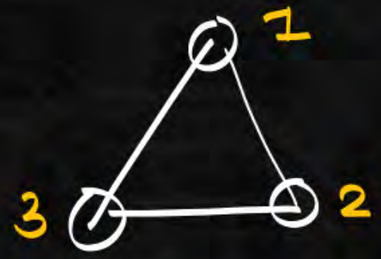
properly coloring.

1.  $\chi(G) = 1$.

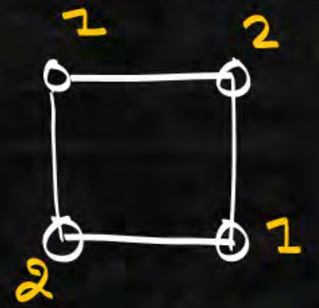
2. Tree: $\chi(\text{Tree}) = 2$.



3. Cycle Graph $(C_n)(n \geq 3)$



$\chi(C_3) = 3$

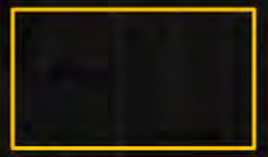


$\chi(C_4) = 2$

$\chi(C_n) = 2$	n is even
$\chi(C_n) = 3$	n is odd.

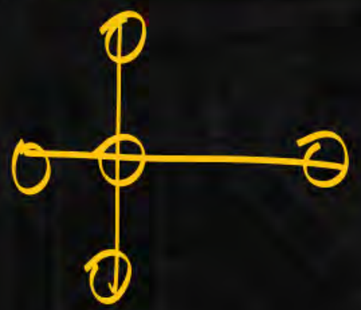
→ Every Tree will always be 2-colorable (True)

→ Every 2-colorable Graph will always be Tree (false)

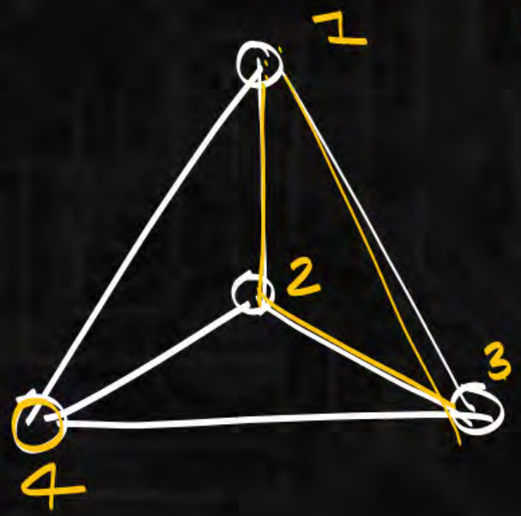


→ Every Even length cycle will always be 2-colorable. (True)

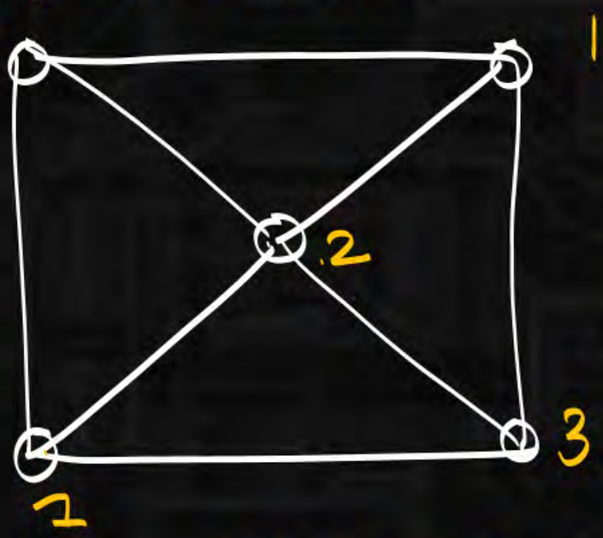
→ Every 2-colorable Graph will be even length cycle (false)



Wheel Graph $(W_n)(n \geq 4)$



$\chi(W_4) = 4$



$\chi(W_5) = 3$

$\chi(W_n) = 3$ n is odd

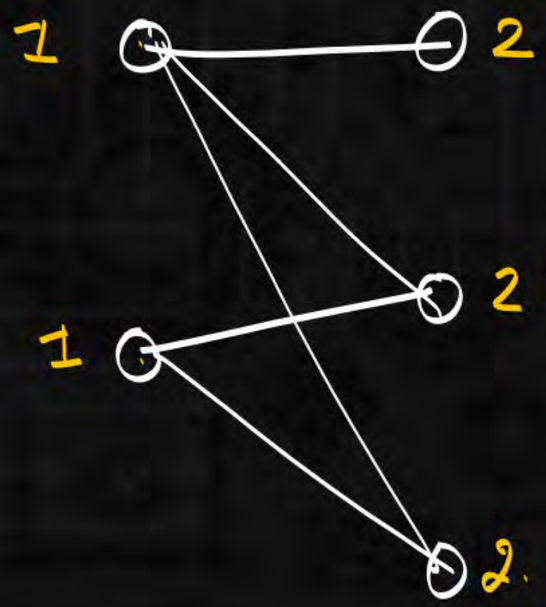
$\chi(W_n) = 4$ n is even.

$X(n) + X(\omega n) = 6$ n is even.

$2 + 4 = 6$

$X(n) + X(\omega n) = 6$ (n is odd)

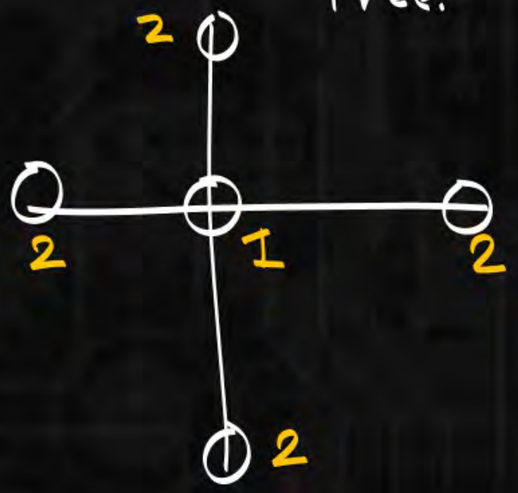
$3 + 3 = 6$

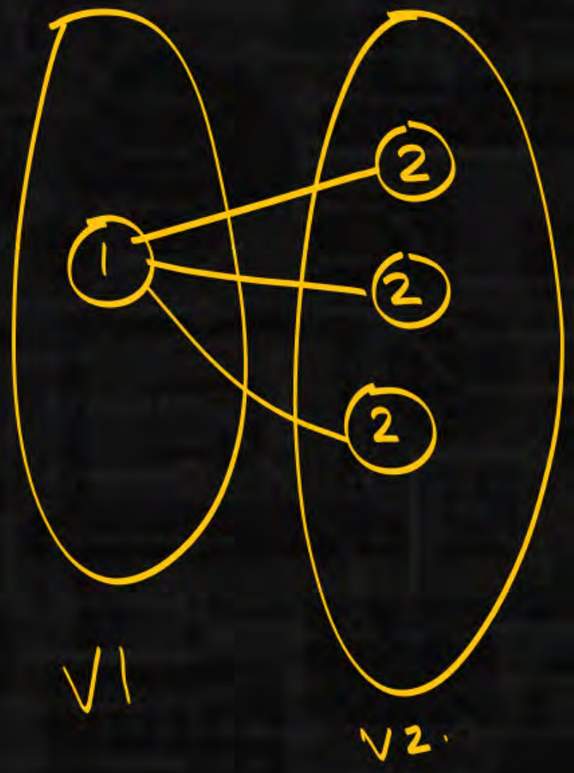


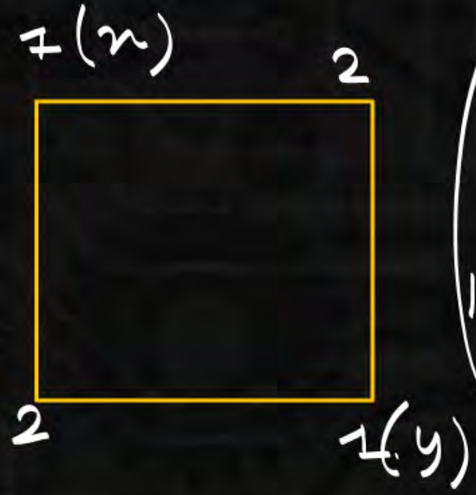
- Every Bipartite Graph will be 2-colorable Graph.
- → Every 2-colorable Graph will be bipartite Graph.
  - → Tree
  - → Even length cycle.

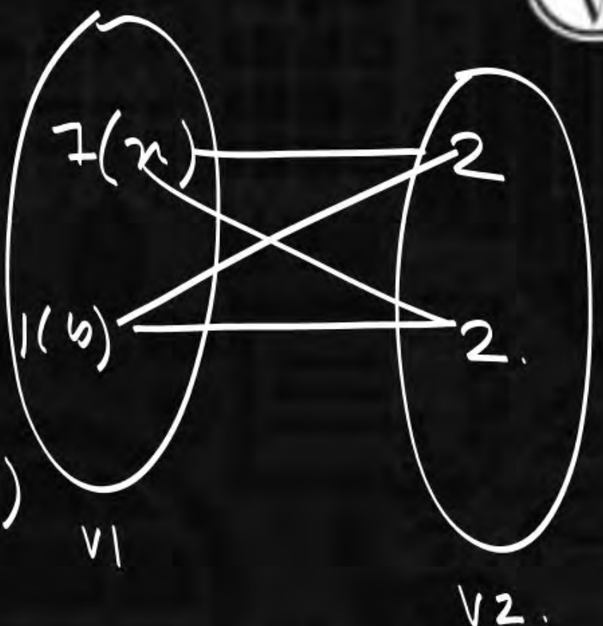
B.P → 2

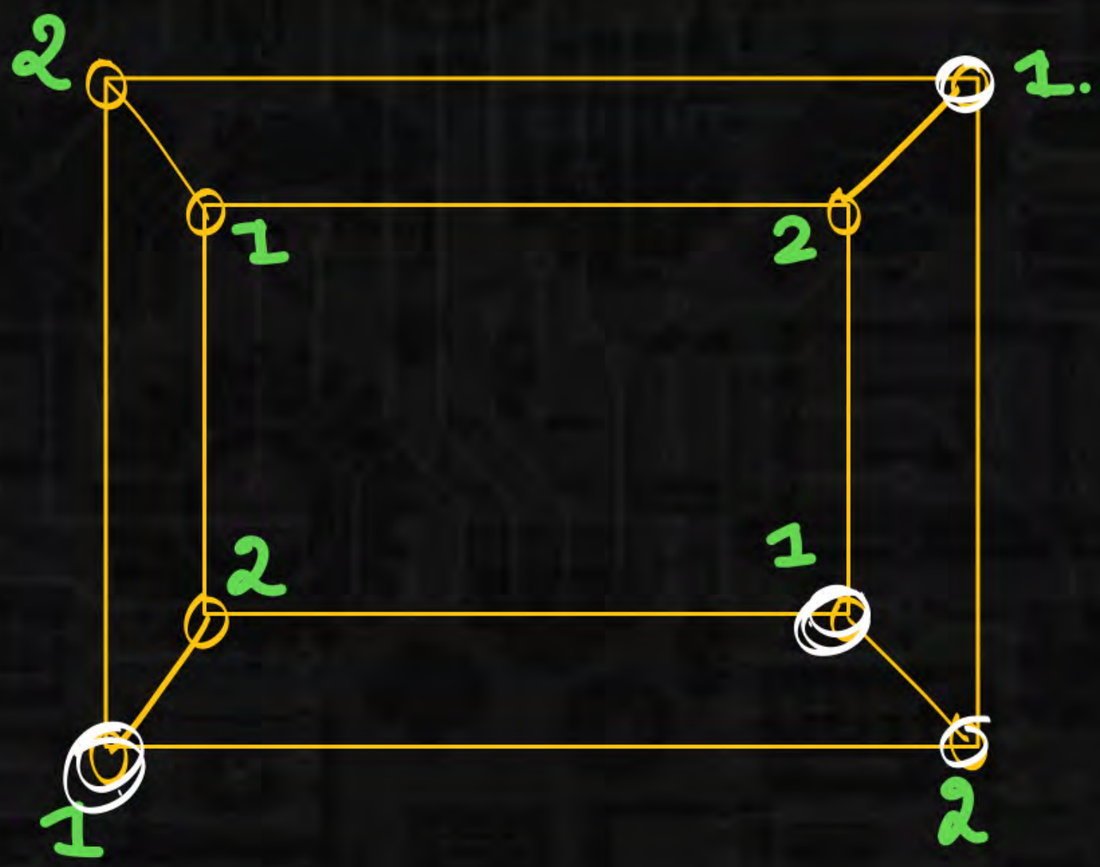
Tree.



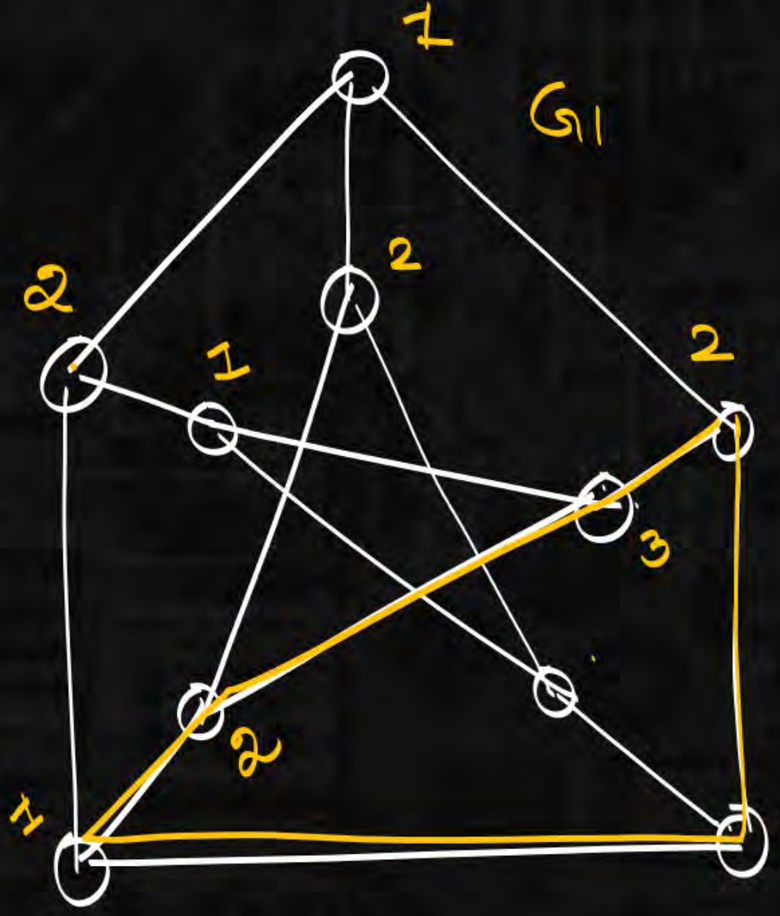








Check its B.P Graph or not ?

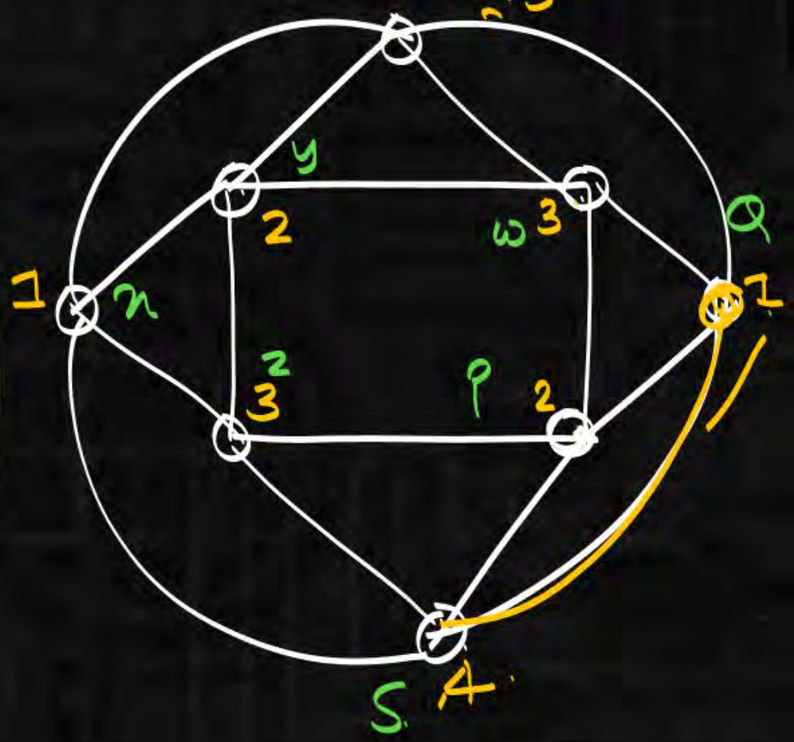


$\chi(G_1) = 3$

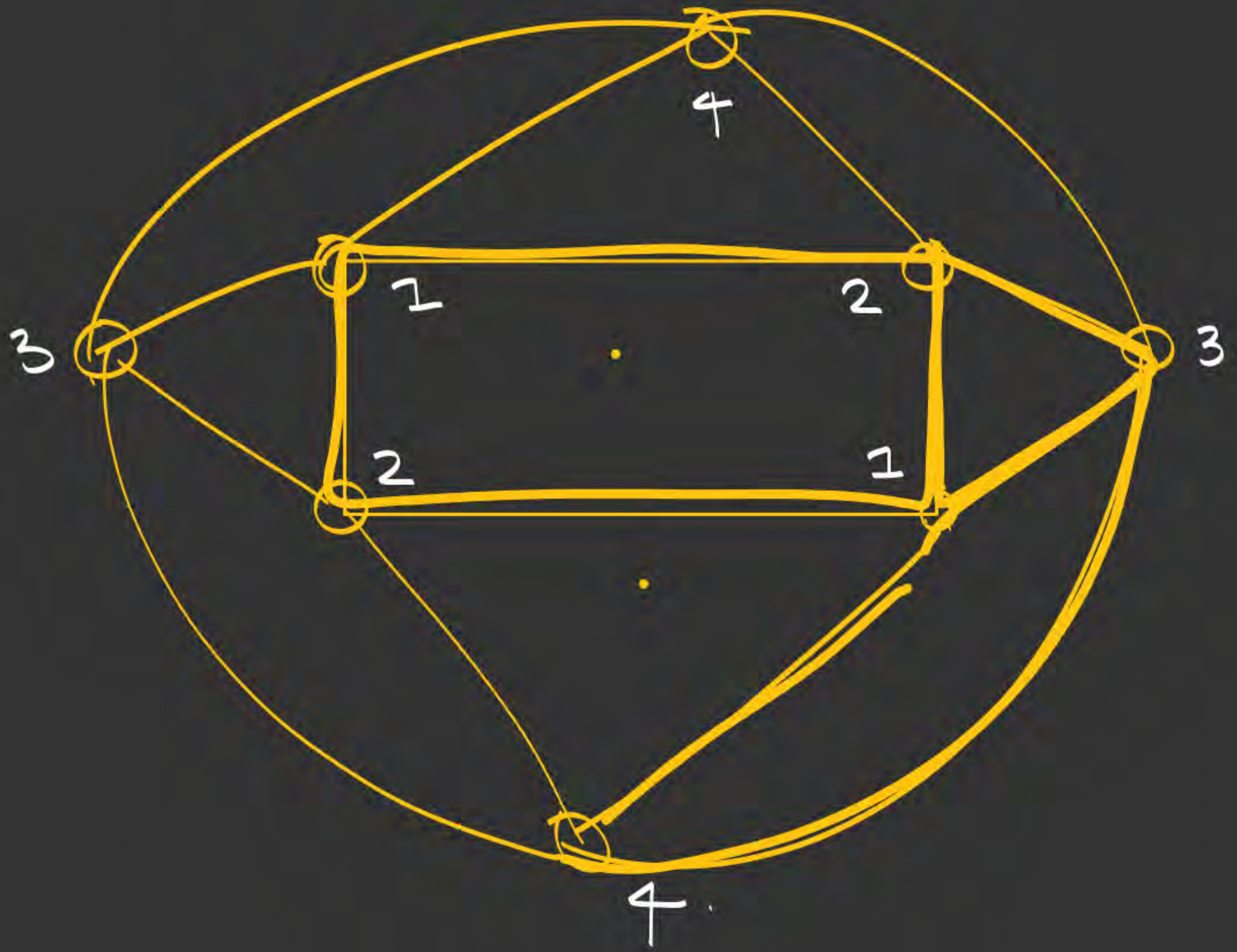
GATE:

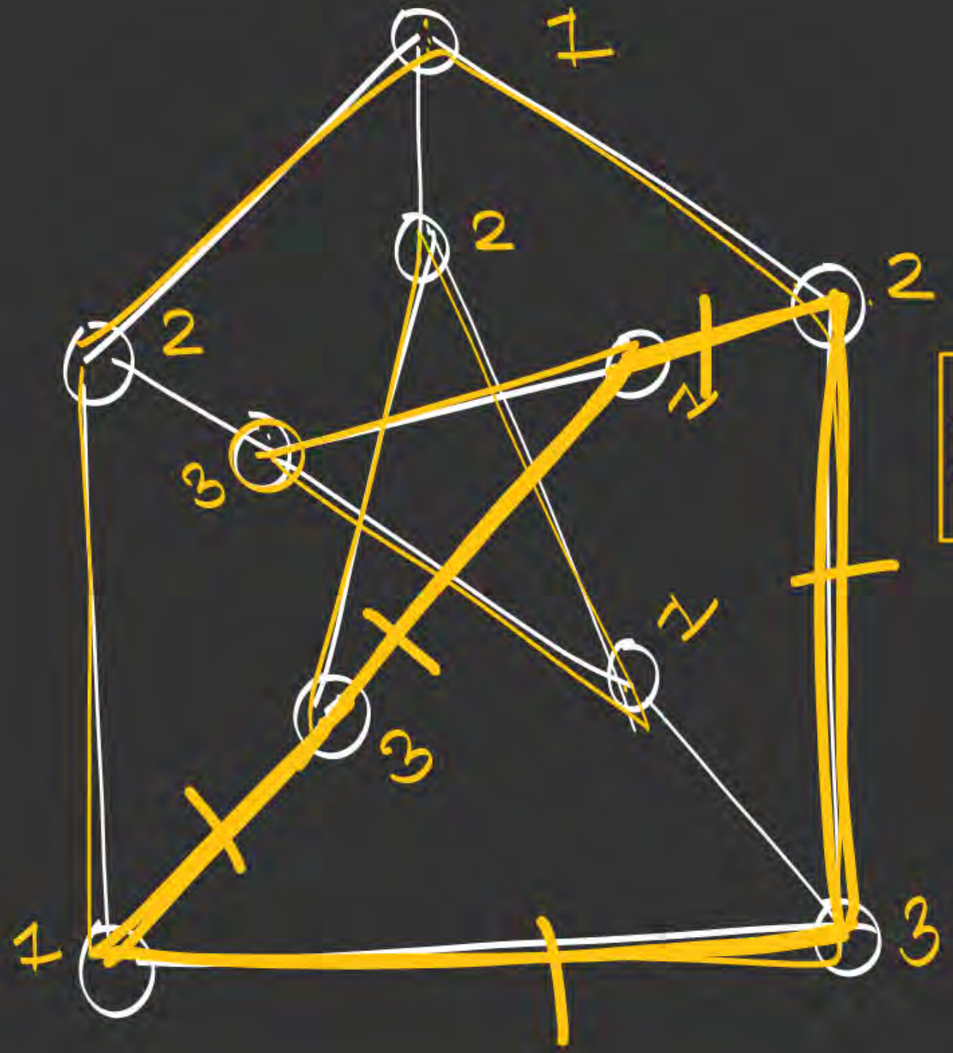
$\chi(G_2) = 3$

GATE:

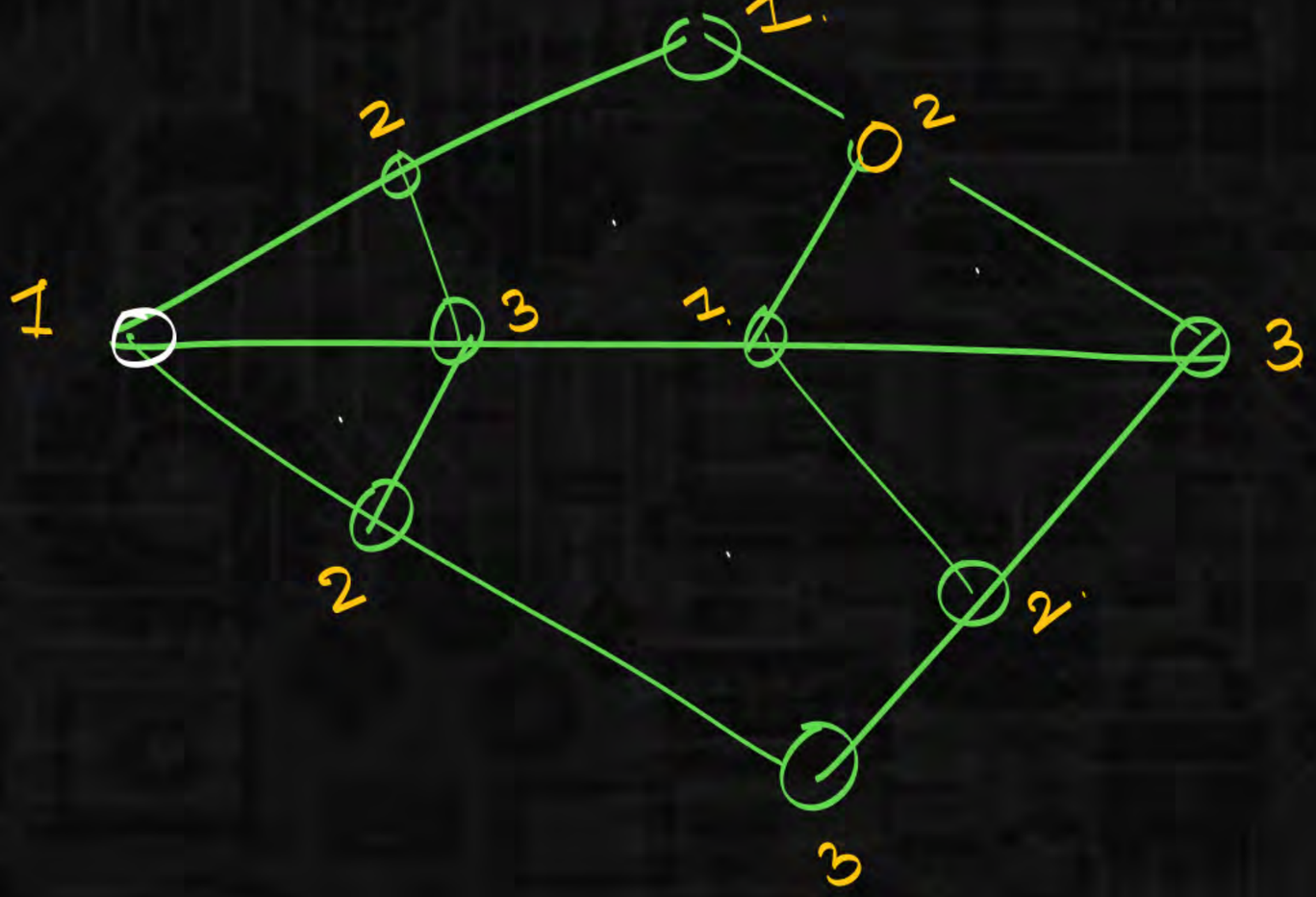


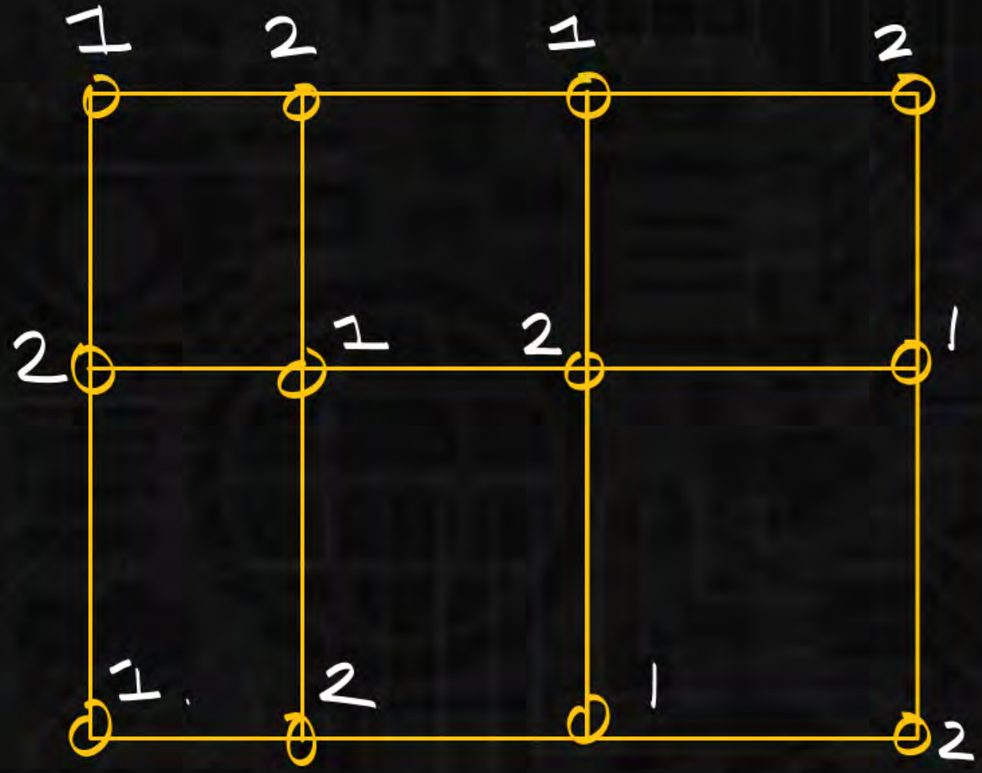
$\chi(G_3) = 4$


4
1
2
3
3
2
1
4



$\chi(G) = 3.$


1
2
2
1
3
1
3
2
2
3


1
2
1
2
2
1
2
1
1
2
1
2


THANK YOU GW
SOLDIERS !