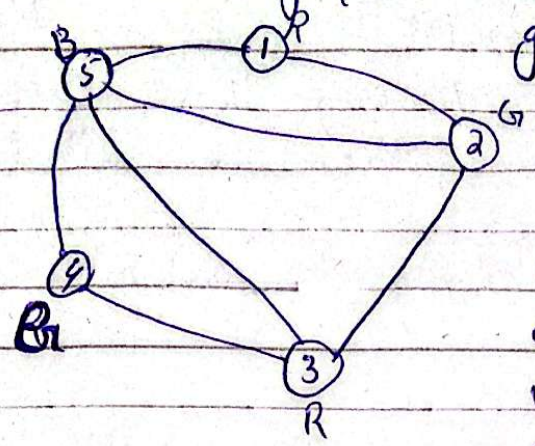
→ Graph coloring using Backtracking Algo:

ex:- Given graph:



and some colors are given m=3 which is R, G, and Blue.
so we have to assign the number of vertex to color such that no two adjacent vertices must have same colors
start from vertex one. (1)

so i have vertices 1, 2, 3, 4, and 5 and colors R, G, R, G, B

so is this the only solution are there are other way possible??

means yes we can assign (1) vertices to the G and then Red to (2) and 3 to G and 4 to Red 5 to Blue.

means same vertices can be ~~change~~ colored in different ways means there are more than one sol possible.

and we want all possible solution

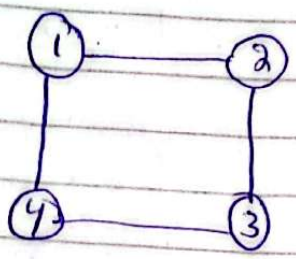
so this type of problem can be solved using back tracking

Note: if we have just two colors is this possible to color that graph No!!
so if i give the 4 colors one more color Yellow. then is this possible the answer is Yes.

So we will define one type of problem here. if a graph is given and some colors are also given and just we want to know can a graph can be colored by using those colors or not, so this problem is called known as.

m (coloring decission) problem

so given graph three vertices are given.

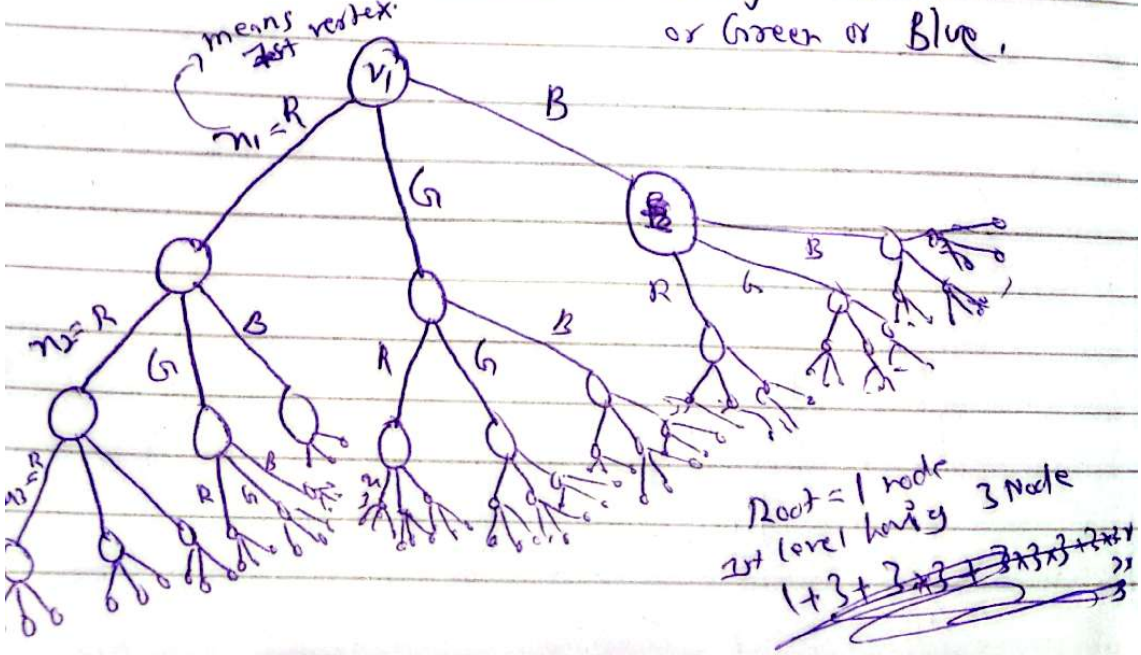


$m = 3$

$\{R, G, B\}$

step1 create a tree.

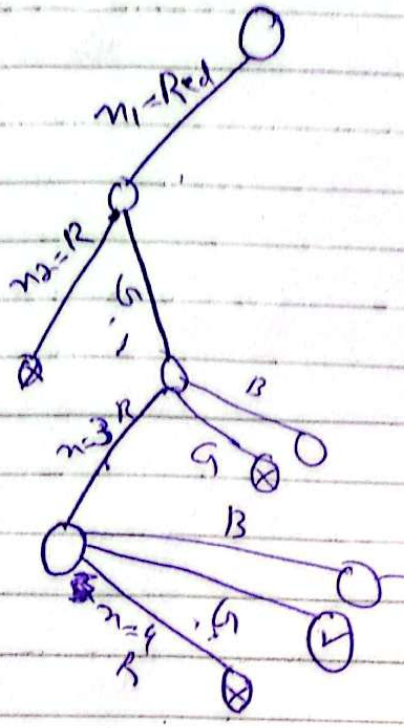
for V_1, i can assighn either red color or Green or Blue.

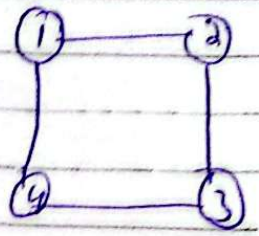


$1 + 3 + 3\times3 + 3\times3\times3 + 3\times3\times3\times3 =$
$1 + 3 + 3^2 + 3^3 + 3^4 =$

That are solve general that how many possibilities possible.

→ Using Back tracking :-
Let's take vertex 1,





→ Now Back track so this is possible solution.

for V_1

~~R, G, B, R~~

Out Sol
① R, G, R, G
② R, G, R, B