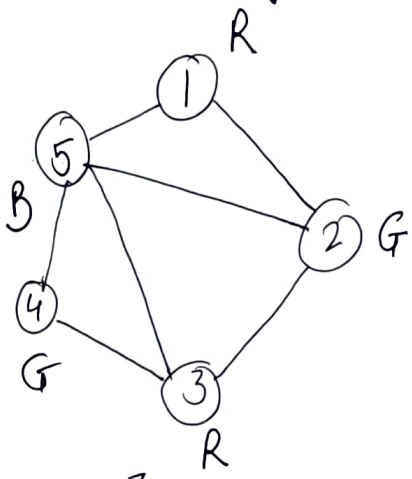
Graph Coloring
Back tracking

└ imposing some cond^{n}

Given A graph
- colors
- we need to color graph in such a way that no two adj nodes will have some color.



m = 3
R, G, B

Back tracking

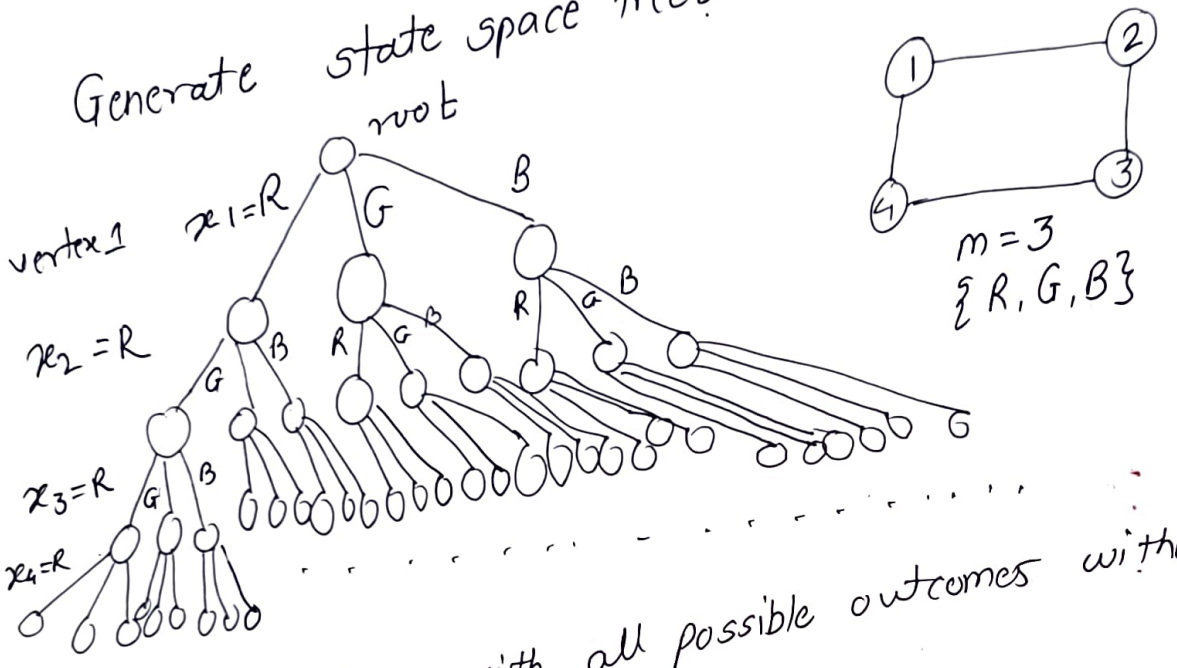
① Graph coloring
② sum of subsets
③ N queen problem

Graph Coloring

In backtracking

- If only 2 colors are given can the graph be colored?
- 1) If a graph is given & some colors are given we need to identify if we can color the given graph or not? (m coloring decision problem)
  2) Min no of ~~coloring~~ colors required to color the graph (mcoloring optimisization problem)
  3) ~~Can~~ the wt are the possible colors for vertices

Generate state space tree?



m = 3
{R, G, B}

State space tree with all possible outcomes without checking adjacency condition.

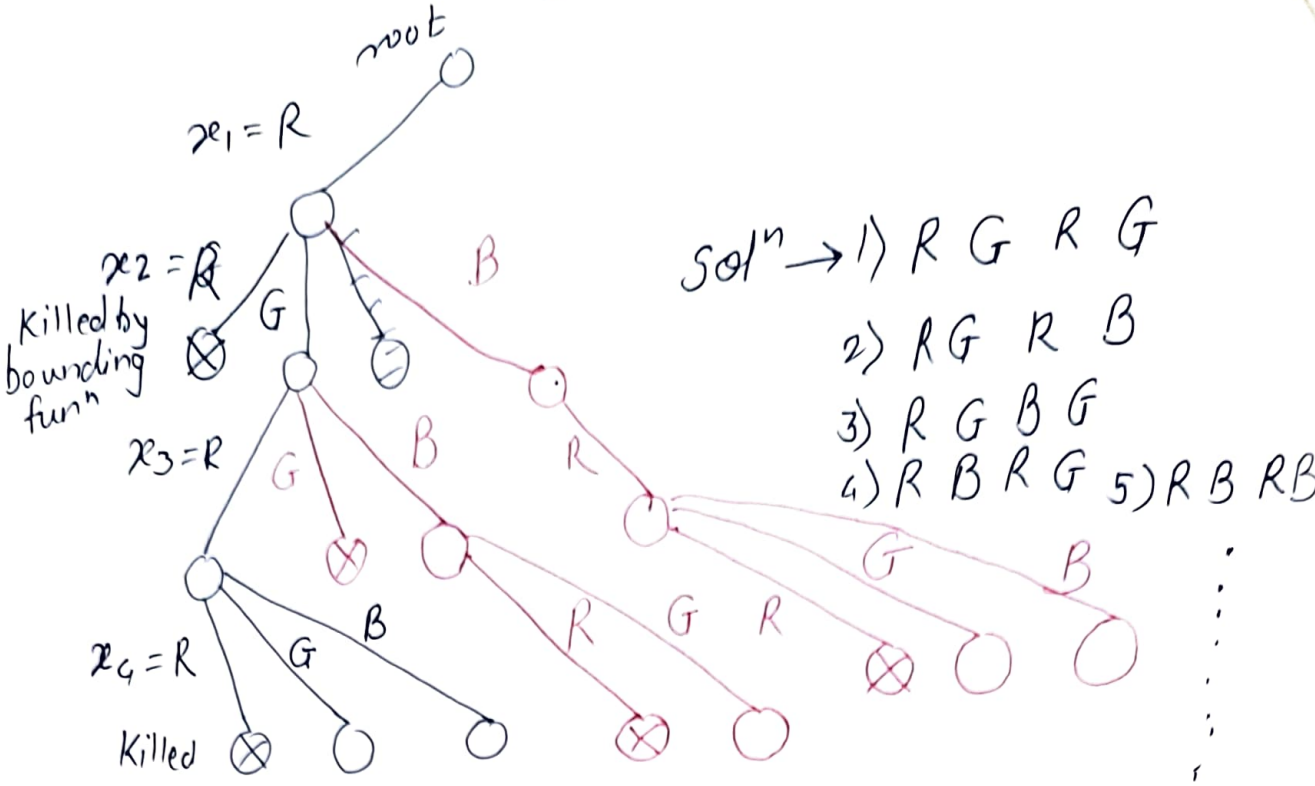
Total No of nodes generated

$= 1 + 3 + 3\times3 + 3\times3\times3 + 3\times3\times3\times3$

(These many nodes are generated without bounding/imposing any condition)

$= 1 + 3 + 3^2 + 3^3 + 3^4 \approx 3^{n+1} = C^{n+1}$ $\overline{O(C^{n+1})}$ exponential time taking problem

Graph Coloring using backtracking



Like Depth first search

$O(3^n)$

Appl^n for printing graph with colors for regions