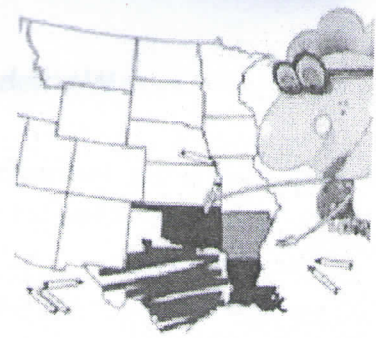


# NOTES--Map Coloring



the goal: to use the minimum number of colors necessary

the guidelines:

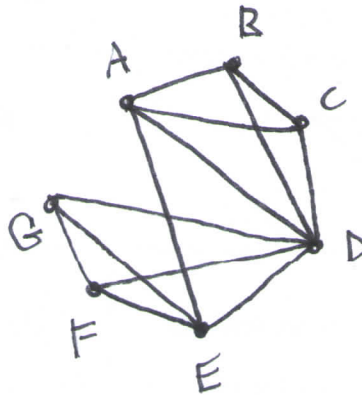
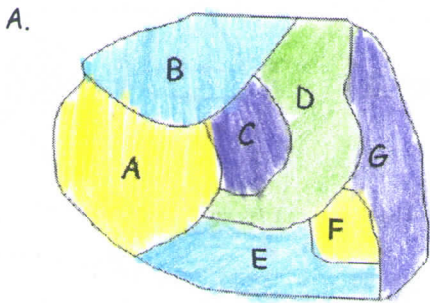
- regions which touch along edges must be different colors.
- regions which share only a vertex can be the same color.

how to construct a graph to represent a map

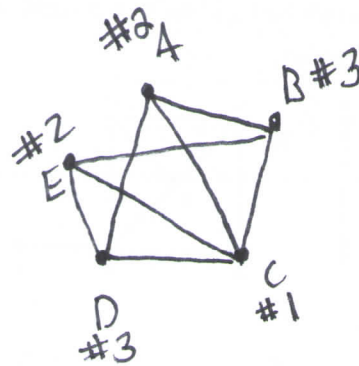
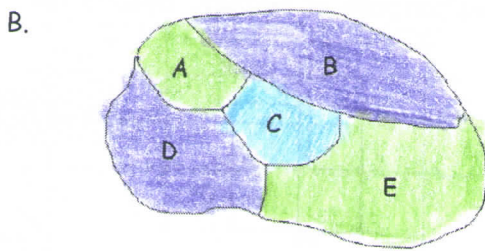
- each region = a vertex
- connect vertices to form edges if the regions share a border (not a vertex)

The chromatic number is the least number of colors needed to color a map.

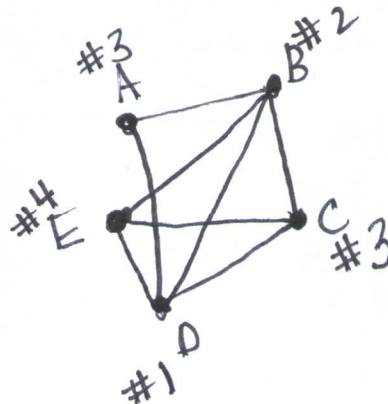
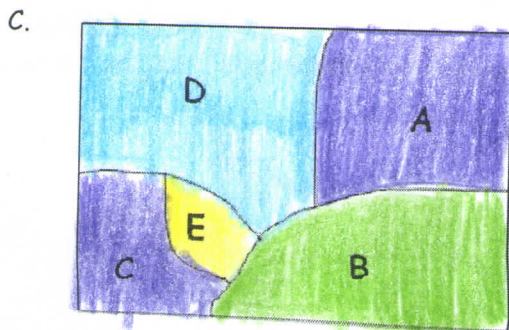
Example 1 Color each map. Draw a graph to represent it. State the chromatic number.



chromatic # = 4



chromatic # = 3

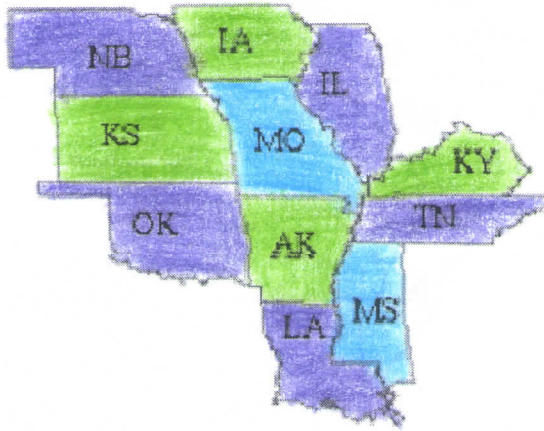


chromatic # = 4

The Four Color Theorem states that the chromatic number is always  $\leq 4$ .

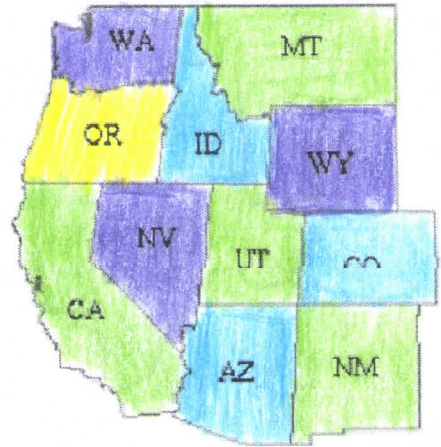
**Example 2** Color each map. State the chromatic number.

A.



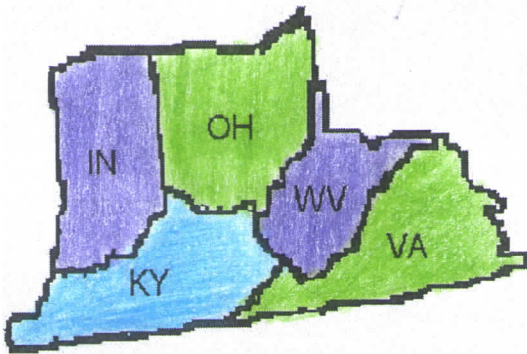
chromatic # = 3

B.



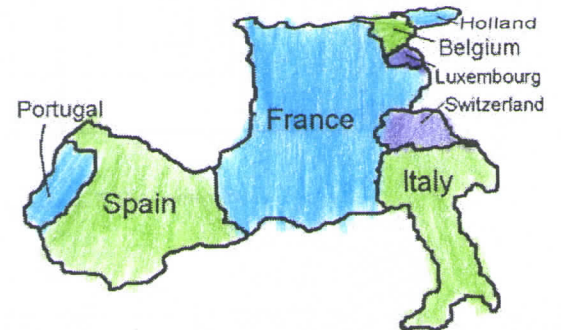
chromatic # = 4

C.



chromatic # = 3

D.



chromatic # = 3