

Review

<https://brilliant.org/wiki/four-color-theorem/>

<https://brilliant.org/wiki/graph-theory/>

https://en.wikipedia.org/wiki/Graph_coloring

Option #2: Represent a Map by Graph with Coloring

For Option #2, you will be representing a map by a graph and finding the coloring of the graph that uses the fewest number of colors. Complete the following tasks:

Part 1:

1. Find the county map of New Hampshire, and create a graph that represents it. Counties should be represented as the vertices and the edges should be drawn between them when two counties share a border. **X**
2. Determine if your graph is 2-colorable, (min **3-colorable**, or **4-colorable**. **X**
3. **Discuss how you found your answer to part above #2** and what real-world applications there might be for your findings. **X**

Part 2:

1. Draw a map of a fictional state consisting of four counties that is 3-colorable. **X**
2. Discuss your method - refer to k-colorable here - for creating the map. Be sure to explain how you verified that your map is indeed **3-colorable**.

Graph coloring is so embedded in mapmaking that we can take any map and apply the four color theorem.

Given a fictional map, we can apply graph coloring as well. Figure 2 depicts a state composed of four counties. Again, we know the graph is planar and thus we can adhere to the four color theorem in our color assignment. Since the graph contains more than one circuit with an odd number of vertices, we know the map is not 2-colorable.

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