Dominic Grant

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https://leetcode.com/dominicgrant/

PA 2:

Theorem 1 Proof:

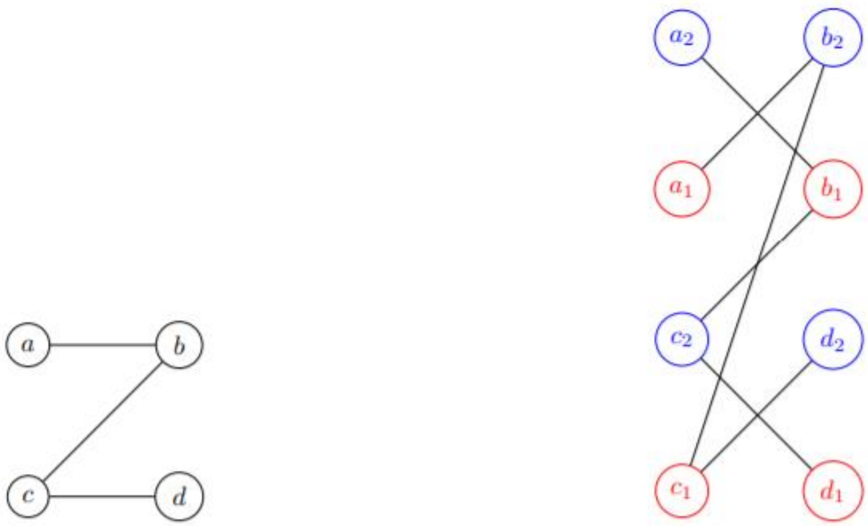

Figure 1: Example 1

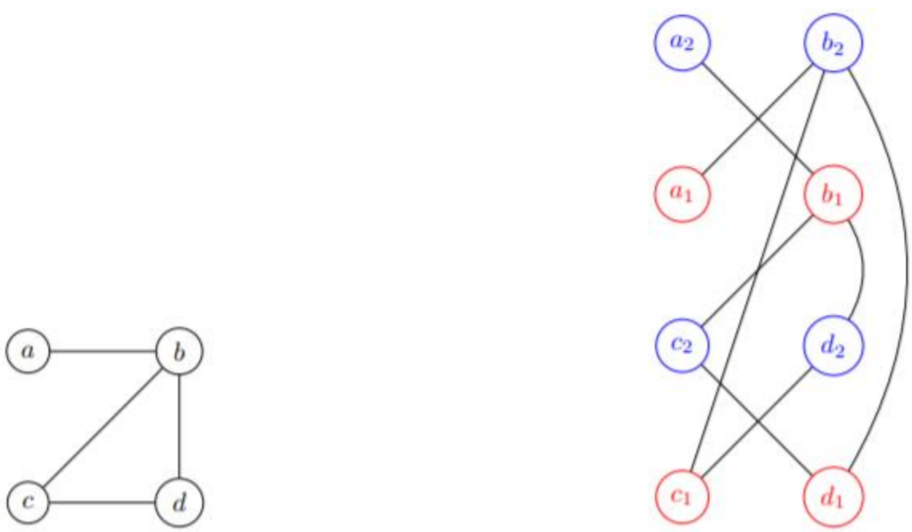

Figure 2: Example 2

Example 1 is a bipartite. If the graph, in this case figure 1, has no odd cycles, it is considered a bipartite. Figure 2 isn't a bipartite as it has an odd cycle of 3. The notable thing is that Figure 1 connects to all the connected nodes without repeating any of them unlike Figure 2. This is what labels it as a bipartite.

However, this also affects the number of connected components. Both figure 1 and 2 have a number of 1. However, once going into their G’, their examples, they change. More precisely, Example 1 changes in there is now 2 connected components of a2 b1 c2 d1 and a1 b2 c1 d2. All of the nodes are connected but they take two lines without reuse of the nodes. This is different from the odd cycle example which connects back to the other side of the nodes so to speak, which gives it a number of 1 for its connected components. These examples show and prove the theorem “Let C be the number of connected components in G. Then the number of connected components in G0 is 2C if and only if the graph G is bipartite.”

b. DFS will be a good efficient algorithm so the code will have somewhere around a O(n+m) runtime.

Code was accepted by Leetcode.