Phân tích và Thiết kế thuật toán
Bài tập tuần 5

Nhóm 11
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Mục lục

0.1 Bài 3

> **Question 1**
>
> A graph is said bipartite if all its vertices can be partitioned into two disjoint subsets X and Y so that every edge connects a vertex in X with a vertex in Y.
>
> - Design a DFS-based algorithm for checking whether a graph is bipartite
> - Design a BFS-based algorithm for checking whether a graph is bipartite

Solution:

- DFS:

  1. Initialize a color array for all the vertices of the graph with value -1.
  2. Pick an uncolored vertex and color it with 0. Perform a DFS traversal of the graph, and for each uncolored vertex encountered, color it with the opposite color of its parent vertex.
  3. If at any point, we encounter an already colored vertex with the same color as its parent, the graph is not bipartite.
  4. If the DFS traversal completes without encountering any such conflict, the graph is bipartite.

- BFS:

  1. Initialize a color array for all the vertices of the graph with value -1.
  2. Pick an uncolored vertex and color it with 0.
  3. Add the vertex to a queue and mark it as visited.
  4. While the queue is not empty, dequeue a vertex and for each of its uncolored neighbors, color it with the opposite color of the dequeued vertex and add it to the queue.
  5. If at any point, we encounter an already colored vertex with the same color as its parent, the graph is not bipartite.
  6. If the BFS traversal completes without encountering any such conflict, the graph is bipartite.