

Find solutions for your homework

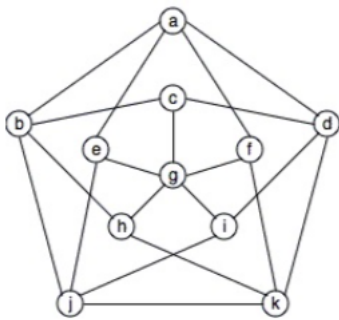
Search

home / study / engineering / computer science / computer science questions and answers / it is np-complete to determine whether an arbitrary g...

Question: It is NP-complete to determine whether an arbitrary graph h...

It is NP-complete to determine whether an arbitrary graph has chromatic number k , where $k \geq 3$. However, determining whether an arbitrary graph has chromatic number 2 is in P.

Given a graph G on n vertices, create an algorithm that will return TRUE if $\chi(G) = 2$ and FALSE if $\chi(G) \neq 2$. Clearly explain how your algorithm works, why it guarantees the correct output, and determine the running time of your algorithm.



Show transcribed image text

Expert Answer ⓘ

Anonymous answered this
1,232 answers

Was this answer helpful?



If the chromatic number is 2 then such graph is known as bipartite graph and we can tell whether graph is bipartite Or not using a simple algorithm with small variation to BFS.

So algorithm is as follows

1. Create two sets A and set B initially both are empty

2. Start with any vertex and perform BFS add first vertex into Set A and now add all its neighbors into other Set and make sure that this vertex is not present in the other Set already and by chance if it is present in both sets then return false

3. If you are able to successfully separate into two sets all the vertices then it you can return true.

So total complexity would be

$O((V + E) V)$ where E is number of edges and V is number of vertices

So taking n as number of vertices edges, no. of edges would be n^2 so the total complexity is

$O(n^3)$.

Comment >

Questions viewed by other students

Q: Please complete ALL parts with neat handwriting let me know if more clarification is needed.

A: [See answer](#)

100% (3 ratings)

Post a question

Answers from our experts for your toughest homework questions

Continue to post
[Continue to edit and attach image\(s\)](#)
My Textbook Solutions

Instant access to step-by-step solutions for textbooks



Add a
textbook



Add a
textbook



Add a
textbook

COMPANY▾

LEGAL & POLICIES▾

CHEGG PRODUCTS AND SERVICES▾

CHEGG NETWORK▾

CUSTOMER SERVICE▾



© 2003-2022 Chegg Inc. All rights reserved.

[add_time] => 1646862178 [url] => https://www.chegg.com/homework-help/questions-and-answers/np-complete-determine-whether-arbitrary-graph-chromatic-number-k-k-3-however-determining-w-q89803497 [type] => 1 [ip] => 172.92.128.50 [account_id] =>)