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The vertex cover problem is an NP-Complete problem, which means that it cannot be solved in polynomial time. However, we can use approximate solutions to find a vertex cover with a size no more than twice the optimal vertex cover.

To find an approximate solution, we initialize an empty set C and consider a collection E of all the edges in the graph. While E is not empty, we pick an edge, add its two endpoints to the result set C , and remove all edges that are incident on either endpoint. We repeat this process until there are no edges left in E . Finally, we print the result set C .

The time complexity of this algorithm is $O(V + E)$, where V is the number of vertices and E is the number of edges in the graph. The space complexity is $O(V)$, as we use a boolean array to keep track of the already visited vertices. Overall, this approach provides a near-optimal solution to the vertex cover problem, which is useful when an exact solution is not required or feasible.