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NP-completeness

1. Prove that $CLIQUE$ is NP–complete. (For definition of CLIQUE see the 2nd problem of the previous problem set)

2. Show that the following decision problem is NP-complete:
   Input: a simple undirected graph G, where $m \leq 2n$
   Question: Is G 3-colorable?

3. Decide whether the following decision problem is in P or is NP-complete:
   Input: an undirected graph G
   Question: Is G 2-colorable?

4. Decide whether the following decision problem is in P or is NP-complete:
   Input: an undirected graph G
   Question: Is it possible to color the nodes of G using four colors (red, green, blue, and pink) in such a way that exactly one node is pink and exactly two nodes are red?