Problem: In the CLIQUE problem, we are given an undirected graph G and an integer K and have to decide whether there is a subset S of at least K vertices such that every two distinct vertices u,v ∈ S have an edge between them (such a subset is called a *clique* of G). Prove that this problem is NP-complete.

Solution:

We can reduce INDSET problem to the given CLIQUE problem and the reduction is as follows:

Given an INDSET problem (G, k) we construct a new graph G` = {G/ vertex set is same and for every pair of vertices if there is an edge between them in G then there won't be any edge between those vertices in G`, and if there is no edge between a given pair then we add an edge between then in G`}.

This conversion can be done in time, polynomial in size of input.

Now if there is a clique of size k in this new graph G`, it implies that there is an independent set of k.

Hence there is a reduction from INDSET problem (which we know it as a NP-COMPLETE) to this given CLIQUE problem. Implies that this CLIQUE problem is also a NP-COMPLETE problem.

GROUP MEMBERS:

11010112 – G. Bhanu Teja

11010126 – K.S.V.A. Ravi Teja

11010169- Abhinav Bommireddi.