From the question, we can know that we have a graph G(V,E) and also have a integer k.
We can convert this question to determine if there is a graph include an independent set of vertices of size >= k1.

Since NP-complete can have NP and NP -hard, so we can just to consider two parts of this proof.
1.The problem is in NP class 2. All other problems in NP class can be polynomial-time reducible to that. We can denote B <= pC, which B is polynomial-time reducible to C.

We can have a pseudocode to prove Independent Set is NP.
Initially, we set flag=true
for every pair {u, v} in the subset V':
    we heck that these two don't
    have an edge between them
    if there is an edge,
    set flag to false and break
if flag is true:
    Solution is correct
else:
    solution is incorrect

2.Independent Set is NP-hard

First, we suppose that the graph G has a clique of size k1 and the presence of clique implies that there are k1 vertices in graph G. Because those edges are contained in graph G, so they will not appear in G'. So, those k1 vertices are not adjacent to each other in G' and thus forming an independent set of size k1.
Second, we suppose the complementary G' has a set of independent vertices of size k1' and they don't share with others. Then, those k1 vertices will share an edge and so be adjacent to each other. So, the graph Gwill have a clique of size k1 and thus the independent set is NP-hard.

Finally, we can prove independent set <= P and because the independent set problem is bot NP and NP hard.

For the proof of statement, we need to check if a vertex cover of size at most integer k2 exists in graph G.

Because we know NP Complete which consists of NP and NP hard. So, we can just from those two parts and then we can prove this problem.

1.Proof that vertex cover is in NP

I wil have the following pseudocode for explanation:

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cnt is an integer
set cnt to 0
for each vertex v in V'
   remove all edges adjacent to v from set E
   increment cnt by 1
   if cnt = k2 and E is empty
   then
        given solution is correct
   else
         given solution is not correct
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The solution for a vertex cover problem is a subset V' of V that includes the vertices cover. Then, we will be able to check if the set V' is a vertex cover of size k2 using above pseudocde in a graph G(V,E).
So, we can easily get that this can be done in a polynomial time. Then, the vertex cover must be a NP.

2. Proof taht vertex cover is NP hard

I will convert this problem to finding out if there is a clique of size k2 in the graph G(V,E), so we just need to check the existence of a clique of size k2 in given graph G.

We suppose there is a clique of size k2 in graph G and let the set of vertices be V', which means |V'| = k2 and in the complement graph G', we can choose any edge(u,v) and then one of u or v must be in set V-V' at least. As we can suppose if both u and v are from set V', the edge(u,v) will belong to V'. So, all edges in G' are covered by vertices in the set of V-V'.

So, we can know that there is a clique of size k2 in graph G if and only if there's a vertex cover of size |V| - k2 in graph G' and also any instance of clique problem will be reduced to an instance of the vertex cover problem. So, it is a NP hard.

Finally, we can conclude that vertex cover must be NP-complete. Because vertex cover is both NP and NP hard.