**9.8)**

Create a graph based on the cards. Each vertex is a packet of cards and the edges are cards that are in the same pack. Attempt to find a minimum cover of the graph, which will result in the minimum k value. If the vertex cover problem is NP hard then this problem is NP hard since it utilizes vertex cover.

**9.10)**

If an algorithm can be written to solve the problem and give an output with k vertices and y edges, then the problem is NP. To prove that it is complete, we can assume that the graph is a clique (maximal complete subgraph). To prove that the graph is a clique we can iterate through all values of k and create a subgraph of all of a subset of k vertices by choosing from all of the vertices. If that subgraph is a clique then the graph contains a clique of k vertices. Then we can check that subgraph to see if it contains y edges. To determine this, $y = (k(k-1))/2$. If the graph is a clique with k vertices (as we determined before) then it is also one with k vertices and y edges.