Assignment 10
Computer Science 235

1) Define *VERTEX-COVER* = {<*G,k*> | *G* is an undirected graph that has a *k*-node vertex cover}, where a ***vertex cover*** of *G* is a subset of the nodes where every edge of *G* touches one of those nodes. Show that this problem is NP-complete.
(Hint: For the second part of the proof, show that 3SAT is polynomial time reducible to VERTEX-COVER. For each Boolean formula, map it to a graph and a value k, by producing variable gadgets [for each variable in the formula produce an edge connecting that variable and its negation] and clause gadgets [each clause gadget is a trio of nodes corresponding to the variables of the clause, connected, as appropriate, to the variable gadgets]).

2) Define *SET-COVER* = {<*S,P,k*> | *S* is a set, *P* is a collection of subsets of *S*, and there exist *k* subsets in *P* which, unioned together, equal *S*}. Show that this problem is NP-complete. (Hint: For the second part of the proof, show *VERTEX-COVER* reduces to it.)