

COMP 610 Homework 4 due 20:00 5/11/07

1. A student was trying to show that the language
 $L = \{(M;w): M(w) \text{ halts after an even number of steps}\}$
is not decidable. His “solution” was: to take an instance $(M;w)$ of HALTING and create an instance of L by doing nothing (ie $M' = M$ and $w' = w$). Show that this is incorrect by finding a particular $(M;w) \in \text{HALTING}$, but with $(M;w) \notin L$.
2. A student was trying to show that the language
 $\text{EQUAL} = \{S : S \text{ can be partitioned into sets which sum to the same value}\}$
is NP-complete. His “solution” was to take an instance (S, t) of SubsetSum and convert it to an instance of EQUAL by letting $S' = S$. Show that this is incorrect by finding a particular $(S, t) \in \text{SUBSETSUM}$ but $S \notin \text{EQUAL}$.
3. A student was trying to show that the language
 $\text{EQUAL} = \{S : S \text{ is a set of integers which can be split into two sets which sum to the same value}\}$
is NP-complete. His “solution” was to take an instance (S, t) of SubsetSum and convert it to an instance of EQUAL by letting S' equal two copies of S (ie for every element in S , S' contains the same element twice). Show that this is incorrect by finding a particular $(S, t) \notin \text{SUBSETSUM}$, but with $S' \in \text{EQUAL}$.
4. A student was trying to show that the language
 $\text{BINPACKING} = \{(S;b,t): S \text{ can be split into } b \text{ sets each of which sums to at most } t\}$.
His “solution” was to take an instance (S, t) of SubsetSum and convert it to an instance of BINPACKING by letting $S' = S$, $b = 2$, and $t' = t$. Show that this is incorrect by finding a particular $(S, t) \in \text{SUBSETSUM}$, but with $(S', b, t') \notin \text{BINPACKING}$.
5. Show that the language
 $\text{TRIPARTITION} = \{S: S \text{ can be split into 3 sets which all sum to the same value}\}$
is NP-complete.