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 \(\text{HALTING}\) 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 \(\text{SubsetSum}\) and convert it to an instance of \(\text{EQUAL}\) 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 \(\text{SubsetSum}\) and convert it to an instance of \(\text{EQUAL}\) 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 \(\text{SubsetSum}\) and convert it to an instance of \(\text{BINPACKING}\) 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
   \[ \text{TRIPTITION} = \{ S : S \text{ can be split into 3 sets which all sum to the same value} \} \]
   is NP-complete.