1. Determine whether the following sets are countable or uncountable. Justify your answers.
   
   (a) The set of all three-element subsets of \( \mathbb{N} \).
   
   (b) The set of all infinite subsets of \( \mathbb{N} \).
   
   (c) The set of all regular languages with alphabet \( \{0, 1\} \).

2. Define a **tedious** state of a TM as a state \( s \) such that there exists a string on which the 
   TM enters \( s \) infinitely often. Show that it is undecidable to determine whether a state \( s \) 
   in a TM is tedious.

3. Show that the following question is undecidable:
   whether the language of an LBA is empty.

4. If \( A \) reduces to \( B \) and \( B \) is a regular language, what can one conclude about \( A \)? Justify 
   your answer.

5. Determine whether each of the following is True or False. Justify your answer.
   
   (a) Every infinite set is countable.
   
   (b) If \( N \) is the set \( \{ \langle G \rangle : G \text{ is CFG that does NOT generate all strings } \} \), then \( N \) is 
       r.e.
   
   (c) It is undecidable to determine whether an NFA accepts its own encoding.
   
   (d) If a language \( L \) is context-sensitive, then there is a Printer-TM that prints out \( L \) 
       in order.

Due: START OF CLASS, Thursday November 12