

## Chapter 5.3 Practice

Use Rice's Theorem, if possible, to prove that the following languages are undecidable.

1.  $L_1 = \{\langle M \rangle \mid M \text{ is a TM and accepts some input}\}$
2.  $L_2 = \{\langle M \rangle \mid M \text{ is a TM and accepts all even numbers}\}$
3.  $L_3 = \{\langle M \rangle \mid M \text{ is a TM and accepts at least two strings of different lengths}\}$
4.  $L_4 = \{\langle M \rangle \mid M \text{ is a TM and accepts when given } \langle M \rangle \text{ as an input}\}$
5.  $L_5 = \{\langle M \rangle \mid \text{whenever } M \text{ is given two positive integers as input on its input tape it halts with their sum on its work tape}\}$
6.  $L_6 = \{\langle M \rangle \mid M \text{ is a TM and accepts the string } 001\}$