Worksheet 14: Mapping Reductions and Time Complexity

Computer Science 311: Computational Structures
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Exercise 1 Let $L = \{\langle M \rangle \mid 1^* \subset L(M)\}$. Use a mapping reduction to show that L is undecidable.

Exercise 2 Consider the following two-tape Turing machine that also decides $\{0^n1^n \mid n \geq 0\}$:

$M =$ "On input w:

1. If the input is not of the form 0^*1^*, REJECT
2. For each zero in the input, write a one to tape 2
3. Return tape 2's head to the left
4. For each one in the input, ensure that we see a one on tape 2
   - If either tape sees a blank before the other, REJECT
   - If both tapes read blanks at the same time, ACCEPT"

Find the time complexity of M.