1. [10 marks] Recall the suffix operation on languages:

\[ \text{suff}(L) = \{ x : \exists y \in L \text{ such that } x \text{ is a suffix of } y \}. \]

Is the class of Turing-decidable languages closed under the operation suff? Prove or give a counterexample.

(It may be very helpful to read the course notes, Chapter 17.)

2. [10 marks] Suppose that \( L \) is a language that is Turing-recognizable but not Turing-decidable. Show that any TM recognizing \( L \) must run forever on infinitely many different inputs.

3. [10 marks] Consider the language

\[ L = \{ \langle M, n \rangle : M \text{ is a DTM, } n \text{ is an integer, and there exists } x \text{ such that } M \text{ halts on input } x \text{ within } n \text{ moves} \}. \]

Is \( L \) Turing-decidable? Prove or disprove.