

Week 1/13 - 1/19 Exercise

January 27, 2020

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1. Prove that it is undecidable whether a given program computes a total function. Hint: show that it is undecidable whether a program computes the identity function, and derive the more general result from this.
2. List the first 10 elements of D as given in Lemma 5.7.1.
3. Show that it is not necessary to assume that every memory cell is initialized to 0.
4. Show that function $x + 1$ is computable by a Turing Machine, if given as input the binary representation of x .
5. Show that a Turing Machine can, given input of form xBy where $y, x \in \{0, 1\}^*$, decide whether $x = y$. An alphabet larger than $\{0, 1, B\}$ may be assumed, if convenient.
6. Show that a counter machine can compute function $x + y, 2 \cdot x, x/2$.