The Theory of Computation

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Solution Manual

Chapter 5, Problem 5.20

Intuitively, we can run inside our non-repeating enumerator an enumerating machine that may cause repetitions, but store every string printed so far on a tape and verify that newly generated strings do not appear on the tape before printing them. That is a simple filtering operation; it clearly terminates in finite time (although it is clearly very slow and very space-consuming). If our enumerator does not take any input and runs forever, it is a trivial matter to convert it to a machine that prints the ith element and halts by running the enumerator internally until it has generated i elements, then printing the last generated element and halting.