Decidability of the halting problem for Matiyasevich deterministic machines

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Problems raised by genetics have been expressed as decidability questions about the monoïd of traces. Professor Yuri Matiyasevich has transformed these problems into a halting problem for apparently very weak machines. The decidability or undecidabil ity of the general non deterministic case hasn't been proved yet; however we prove the following deterministic case is decidable: with k a constant, the operators on the integer register are $X \leftarrow X+1$, $X \leftarrow X-1$, $X \leftarrow k \times X$, $X \leftarrow \lfloor X/k \rfloor$, with a congruence test modulo k and an equality test; in fact, we show that there is an effective computation that transforms such a machine into a finite automaton.