The Theory of Computation

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Solution Manual

Chapter 5, Problem 5.12

We are given a primitive recursive function $g(y)$. Then define

$$\begin{cases} f(0, y) = \Pi_1^1(y) \\ f(n+1, y) = g(\Pi_2^3(n, f(n, y), y)) \end{cases}$$

which define $f(n+1, y)$ to be $g(f(n, y))$ and thus uses recursion to obtain the iteration. We have basically given a tail-recursive mechanism for iteration, as is done in any functional programming language.