The Theory of Computation

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Solution Manual

Chapter 5, Problem 5.13

We are given primitive recursive functions g and h. Note that the effect of the definitional mechanism given is to define $f(n, x)$ to be $g(h(h(\ldots h(x)\ldots)))$, with n nestings of h. We can obtain this result by using iteration as in Exercise 5.12 and ending with one application of g. Thus we define

$$f(n, x) = g(f'(n, x))$$

and now use iteration to define $f'(n, x)$ to be $h^n(x)$:

$$\begin{cases} f'(0, x) = x \\ f'(n+1, x) = h(f'(n, x)) \end{cases}$$