

Lecture #2: Modelling Computation of Functions I

What Will Happen During the Lecture

Remember... You Had Homework!

Students were asked to have worked through a set of notes before this first lecture:

- Lecture Notes — “Modelling Computation of Functions I”

Of course, you may attend the lecture presentation if you have not worked through this material ahead of time — but it will not be repeated for you during the lecture presentation.

Solving a Problem

The rules that can be used to define “primitive recursive functions” are extremely limited — and it may be surprising that so many mathematical functions can be defined using them.

Consider the function $\text{exp2} : \mathbb{N} \rightarrow \mathbb{N}$ such that, for all $x \in \mathbb{N}$,

$$\text{exp2}(x) = 2^x,$$

and the function $\text{log2} : \mathbb{N} \rightarrow \mathbb{N}$ such that, for all $x \in \mathbb{N}$,

$$\text{log2}(x) = \begin{cases} 0 & \text{if } x = 0, \\ \lfloor \log_2 x \rfloor & \text{if } x \geq 1 \end{cases}$$

— so that, for a positive input x , $\text{log2}(x)$ is the largest integer that is less than or equal to the real number $\log_2 x$.

During the lecture presentation, the process introduced in the lecture notes, to prove that functions are primitive recursive, will be used to show that each of the above functions is primitive recursive.

An incomplete set of notes is available. If you would like to get ahead then you can try to fill in these notes (solving some or all of the problem to be considered) before the lecture presentation.