

## INFINITE WIDTH LOGIC GATES (COMPUTING ON SEQUENCES)

Infinite logic gates. Each layer processes the arbitrarily long previous layer. For instance:

Let  $x = x_1, x_2, x_3, \dots$

Then perhaps  $f_1 = x_1 \wedge x_2, x_3 \wedge x_4 \wedge \dots$

Or  $g_n = \sum_{1 \leq k \leq n} x_k$ , where  $1 + 1 = 0$ .

So a gate can “fan in” any finite prefix of its input.

In general, the last applied gate will have an infinite (sequence) output. So we end up with a composed function that generates an output sequence from an input sequence. We can allow a finite final gate, such as a single parity bit. Though the value of this parity bit would alternate as more of the input is fed into the first gate, etc.

Some of the gates could apply CA rules. We have arbitrarily wide parallel computation.