



Why

We want to associate elements of \mathbf{Z} with bitstrings for use on digital computers.¹

Definition

A *digital integer* is a bit-string. The set of *d-bit integers* is the set of length-*d* bit strings $\{0, 1\}^d$. For example, the set of 8-bit digital integers is the set $\{0, 1\}^8$.

Correspondence with \mathbf{Z}

The bit string $x \in \{0, 1\}^d$ corresponds to the integer $\sum_{i=1}^d x_i 2^i$.

Notation

We denote the set of 8-bit (16-bit, 32-bit, 64-bit) integers by `int64` (`int8`, `int16`, `int32`).

It is easy to embed x in `int8` by considering x' in `int16` defined by

$$x' = (x_1, x_2, x_3, x_4, x_5, x_6, x_7, x_8, 0, 0, 0, 0, 0, 0, 0, 0)$$

In other words, we associate an 8-bit integer with a 16-bit integer. Naturally, we associate the integers with bit strings.

Signed integers

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¹Future editions will discuss digital computers.

²Future editions will include an account of signed integers, or will place this in another sheet.

