Integer Representation

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In SACLIB, β is the radix, or base, for the representation of large integers. Let A be any positive integer. A can be uniquely represented in the form

$$A = \sum_{i \leq n-1} a_i \beta^i,$$

with $a_i \geq 0$ for all i and $a_n > 0$. The a_i are called the β-digits of A and n is the β-length of A. For the most part, SACLIB integers are represented as lists. The integer A above is represented as the list $(a_0, a_1, \ldots, a_{n-1})$ provided that $n > 1$, but if $n = 1$, it is represented as just the C integer $a_0 = A$. The negative integer $-A$ is represented as the list $(-a_0. - a_1, \ldots, -a_n)$ if $n > 1$, but if $n = 1$, it is represented as the C integer $-a_n$. Of course zero is also represented as the C integer 0.

For the sake of greater efficiency, integers are in some contexts represented by arrays. In the array representation of A, any array of size greater than or equal to n may be used and the β-digit a_i of $|A|$ is stored in $A[i]$. The sign of A and the β-length of A are stored separately.