

Proposal for C2Y WG14 N3738

Title: Preferred quantum exponent for `nextafterdN`
Author, affiliation: C FP group
Date: 2025-11-04
Proposal category: Editorial
Reference: N3685

Background

Preferred quantum exponents for results of decimal floating-point operations are given in Table 5.2 (5.3.5.3.4), which says the preferred quantum exponent for `nextup`, `nextdown`, `nextafter` and `nexttoward` is “least possible”.

The description of the `nextafter` functions in 7.12.12.3 #2 says

The `nextafter` functions return y if x equals y .

It’s not clear that this is intended to mean they return the numerical value of y , though not necessarily with the quantum exponent of y . The changes below explicitly say “numerical value of y ” and add a footnote to explain that the preferred quantum exponent is specified in Table 5.2.

The changes below also address the same issue for the `nexttoward` functions. Since the `nexttoward` functions are specified as equivalent to the `nextafter` functions, with qualifications, another footnote to explain the use of “numerical value” doesn’t seem needed.

The issue does not arise for the `nextup` and `nextdown` functions which avoid the case of equal arguments by having just one argument.

The changes below require change in any implementation of `nextafter` or `nexttoward` that for x equals y returns the representation of the argument y without adjusting the quantum exponent as required by Table 5.2 (5.3.5.3.4).

Suggested Changes

In 7.12.12.3 #2 change:

... The `nextafter` functions return y if x equals y .

to:

... The `nextafter` functions return **the numerical value^{*)} of y** if x equals y .

***) For decimal floating types, Table 5.2 specifies the preferred quantum exponent of the result.**

In 7.12.12.4 #2 change:

... and the functions return ~~y converted~~ to the return type of the function if x equals y. ²⁹⁰⁾

to:

... and the functions return the numerical value resulting from converting y to the return type of the function if x equals y. ²⁹⁰⁾