Proposal for C2Y
WG14 N3537

Title:	Correct and clarify 7.3.1 Introduction of Complex arithmetic <complex.h>
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Proposal Category:	Editorial
Reference:	N3390, N3460, N3550

1. Background Rationale

The existing clause #3 contains a reference to a value of **`complex`** type as the imaginary unit. This is problematic. The mathematical imaginary unit i has the defining property $i^2 = -1$, but that does not completely define a value in a complex type because the value must have a real part which could be +0 or -0. Also, as noted on other occasions, expectations about the mathematical imaginary unit do not carry over to a model for complex arithmetic with values limited to complex types when complex values may have parts that are signed zeros or infinities. It should be noted that

a. per N3460, 6.2.5 now refers to the mathematical imaginary unit, although only in the context of describing mathematical values; and

b. the suggested change to #3 is intended to be independent of the removal of the macro **`I`** as proposed in N3390

The existing paragraph #4 is misstated: It says "... and other functions ... which are corresponding functions with **`float`** and **`long double`** parameters and return values." However, the parameter types and most of the return types for these functions are complex types. Existing paragraph #4 is also missing an explanation of the scenario for the **`CMPLX`** family of macros.

2. Suggested Changes

7.3.1#3 Introduction

... the macro **`_Complex_I`** expands to an arithmetic constant expression of type **`float _Complex`** with the value of ~~the imaginary unit; the~~ its real part being positive or unsigned zero and the value of its imaginary part being one; the macro ...

NOTE: *There is now a* ***blank space*** *added after the semi-colon and before the following* ***the***.

7.3.1#4 Introduction

Each synopsis, other than for the **`CMPLX`** macros, specifies a family of functions consisting of a principal function with one or more **`double complex`** parameters and a **`double complex`** or **`double`** return ~~value; and other functions with the same name but with **`f`** and **`l`** suffixes which are corresponding functions with **`float`** and **`long double`** parameters and return values.~~ type, and similar functions whose names have **`f`** and **`l`** suffixes and whose parameter and return types have corresponding real types **`float`** and **`long double`**. The synopsis for the**`CMPLX`** macros is similar , except that the parameters have real floating types and the suffixes are **`F`** and **`L`**.