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2.3 Underflow

Underflow occurs, roughly speaking, when the result of an arithmetic operation is so small that it cannot be stored in its intended destination format without suffering a rounding error that is larger than usual.

2.3.1 Underflow Thresholds

Table 11 shows the underflow thresholds for single, double, and double-extended precision.

Table 11 Underflow Thresholds

Destination Precision	Underflow Threshold	
single	smallest normal number	1.17549435e–38
	largest subnormal number	1.17549421e–38
double	smallest normal number	2.2250738585072014e–308
	largest subnormal number	2.2250738585072009e–308
quadruple	smallest normal number	3.3621031431120935062626778 4932
	largest subnormal number	3.3621031431120935062626778 4932
double-extended (x86)	smallest normal number	3.3621031431120935062 6e–4932
	largest subnormal number	3.3621031431120935059 0e–4932

The positive subnormal numbers are those numbers between the smallest normal number and zero. Subtracting two (positive) tiny numbers that are near the smallest normal number might produce a subnormal number. Or, dividing the smallest positive normal number by two produces a subnormal result.

The presence of subnormal numbers provides greater precision to floating point calculations that involve small numbers, although the