

Scientific Notation

$$35.2 \mu\text{sec} \rightarrow 35.2 \times 10^{-6} = 0.0000352$$

$$\underline{3.52} \times 10^{-5}$$

float \rightarrow

1	8	23
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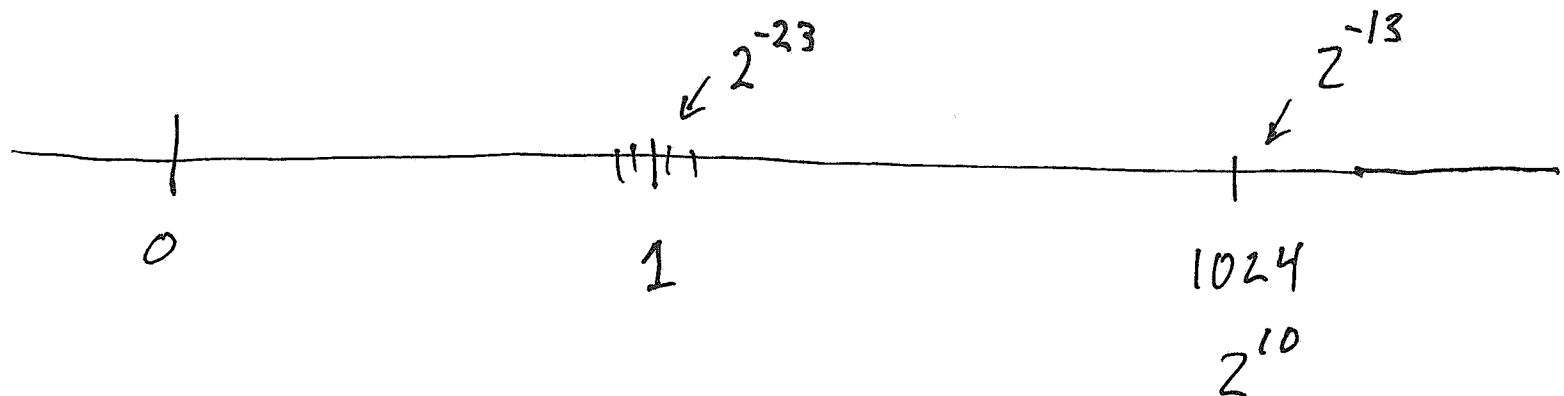
\swarrow Sign bit
 \swarrow Exponent (Exp)
 \swarrow Mantissa Significand
 $b_1 b_2 \dots b_{23}$

$$\pm 2^{\text{Exp} - 127}$$

$$1.b_1 b_2 \dots b_{23}$$

Implied

$$1 + b_1 \cdot 2^{-1} + b_2 \cdot 2^{-2} + \dots + b_{23} \cdot 2^{-23}$$



$$2^{254-127} \approx 2^{127} = 10^{+38}$$

$$2^{1-127} \approx 2^{-126} = 10^{-38}$$

$$\text{eps} = 2^{-23} \approx 1.19 \times 10^{-7}$$

Range 4.3×10^{26} m Visible Universe
 4.3×10^{36} angstroms

$$\begin{aligned} \text{LA to NY} & 4.489 \times 10^6 \text{ m} \\ & \times 1.19 \times 10^{-7} \\ & 0.535 \text{ m} \end{aligned}$$

Special Case

$$\text{Exp} = 255$$

t/- Inf Significand = \emptyset

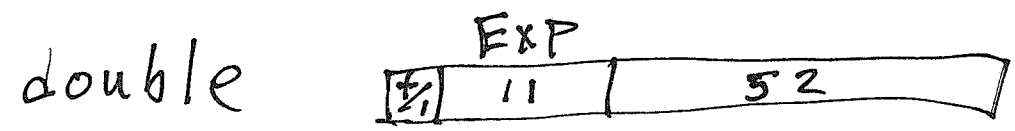
nan

NaN

significand $\neq \emptyset$

Exp = 0 Loss Implied 1
Underflow

0. $b_1 \dots b_{52}$



$$\pm 2^{\text{Exp}-1024} 1. b_1 \dots b_{52}$$

Range $10^{\pm 308}$

eps $\cdot 2^{-52} \doteq 2.22 \times 10^{-16}$