Numerical Methods

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1 Computer Arithmetic

1.1 Significant Numbers

Digits used to express a number. Such that 0.0036, 0.000587, 0.000000296 all have only 3 significant figures since the 0's only help to fix the position of the decimal point.

$$3.9 \times 10^6 \rightarrow 2 \text{ significant digits}$$

$$3.909 \times 10^6 \rightarrow 4 \text{ significant digits}$$

$$3 \times 10^6 \rightarrow 1 \text{ significant digits}$$

1.2 Floating Point Numbers

Any integer $\beta > 1$ can be used as the base for a number system. Now, since the typcial computer works in binary, there's certain errors while rounding off. For example a simple number as $\frac{1}{10}$ requires an infinite binary expression:

$$\frac{1}{10} = (0.00011..)_2$$

But in computer it will return

$$0.100000001490116119384765625000000000000$$

if you print 0.1 from a 32 bit workstation