

The difference that we get between the 3 digit precision and "infinite" precision is called roundoff error

Roundoff error is produced when a computer or a calculator is used to perform real number calculations.

Roundoff error occurs because the arithmetic performed in the machine involves numbers with only finite number of digits. Thus calculations are performed with only approximate representations of actual numbers

2) Representing real numbers as binary numbers.

x - real number \Leftrightarrow we can write it in the fo

$$X = \pm b_n 2^n + b_{n-1} 2^{n-1} + \dots + b_0 + b_{-1} 2^{-1} + b_{-2} 2^{-2} + \dots$$

where $n \geq 0$ is integer and $b_i = \begin{cases} 0 \\ 1 \end{cases} \forall i$

Then

$$X = \pm \left(\overbrace{b_n b_{n-1} \dots b_0}^{\text{integer part}} ; \overbrace{b_{-1} b_{-2} \dots}^{\text{fractional part}} \right)_2$$

binary point

2 indicates binary system