What about numbers with fractional part?

$D = d_{n-1} d_{n-2} \cdots d_1 d_0 . d_{-1} d_{-2} \cdots d_{-m}$

$d_i \in \{0, 1, 2, \cdots, 9\}$

$V(D) = d_{n-1} \times 10^{n-1} + d_{n-2} \times 10^{n-2} + \cdots$
$d_1 \times 10^1 + d_0 \times 10^0 + d_{-1} \times 10^{-1} + d_{-2} \times 10^{-2}$
$+ \cdots + d_{-m} \times 10^{-m}$

$D = 26.75 \Rightarrow D = 2\times10 + 6\times10^0 + 7\times10^{-1} + 5\times10^{-2}$

$B = b_{n-1} b_{n-2} \cdots b_1 b_0 . b_{-1} b_{-2} \cdots b_{-m}$ $b_i \in \{0, 1\}$

$V(B) = b_{n-1} \times 2^{n-1} + b_{n-2} \times 2^{n-2} + \cdots + b_1 \times 2 + b_0 \times 2^0$
$+ b_{-1} \times 2^{-1} + b_{-2} \times 2^{-2} + \cdots + b_{-m} \times 2^{-m}$

Exp: $(11010.11)_2 = ?$

$1\times2^4 + 1\times2^3 + 0\times2^2 + 1\times2^1 + 0\times2^0 + 1\times2^{-1} + 1\times2^{-2}$
$= 16 + 8 + 2 + 0.5 + 0.25 = 26.75$

$(11010.11)_2 = 26.75_{10}$

Sep 10-11:44 AM

What about from decimal fraction to binary?

$F = b_{-1} \times 2^{-1} + b_{-2} \times 2^{-2} + \cdots$

$2F = \underbrace{b_{-1}}_{\text{integer part}} + \underbrace{b_{-2} \times 2^{-1} + b_{-3} \times 2^{-2} + \cdots}_{\text{fractional part}}$

Continue the process until the fractional part is zero or we have obtained sufficient number of digits.

Exp: 0.625_{10} to binary

$0.625 \times 2 = 1.25 = 1 + 0.25 \Rightarrow b_{-1} = 1$
$0.25 \times 2 = 0.5 = 0 + 0.5 \Rightarrow b_{-2} = 0$
$0.5 \times 2 = 1.0 = 1 + 0.0 \Rightarrow b_{-3} = 1$

$0.625_{10} = (0.101)_2$

Sep 10-12:02 PM

The process does not always terminate. If it does not terminate the result is a repeating fraction

Exp: 0.7_{10} to binary

$0.7 \times 2 = 1.4$ 1
$0.4 \times 2 = 0.8$ 0
$0.8 \times 2 = 1.6$ 1
$0.6 \times 2 = 1.2$ 1
$0.2 \times 2 = 0.4$ 0

$0.7_{10} = 0.1\underline{0110}\,\underline{0110}\,\underline{0110}\cdots_2$

Sep 10-12:14 PM