

### Real Numbers Conversion

$$\dots \cdot 2^5 \cdot 2^4 \cdot 2^3 \cdot 2^2 \cdot 2^1 \cdot 2^0 \cdot \frac{1}{2^1} \cdot \frac{1}{2^2} \cdot \frac{1}{2^3} \cdot \frac{1}{2^4} \cdot \frac{1}{2^5} \cdot \frac{1}{2^6} \dots$$

$$\dots \cdot 32 \cdot 16 \cdot 8 \cdot 4 \cdot 2 \cdot 1 \cdot 0.5 \cdot 0.25 \cdot 0.125 \cdot 0.0625 \cdot 0.03125 \cdot 0.015625 \dots$$

### Fixed Point

$$(2.5)_{10} = (10.1)_2$$

$$(10.75)_{10} = (1010.11)_2$$

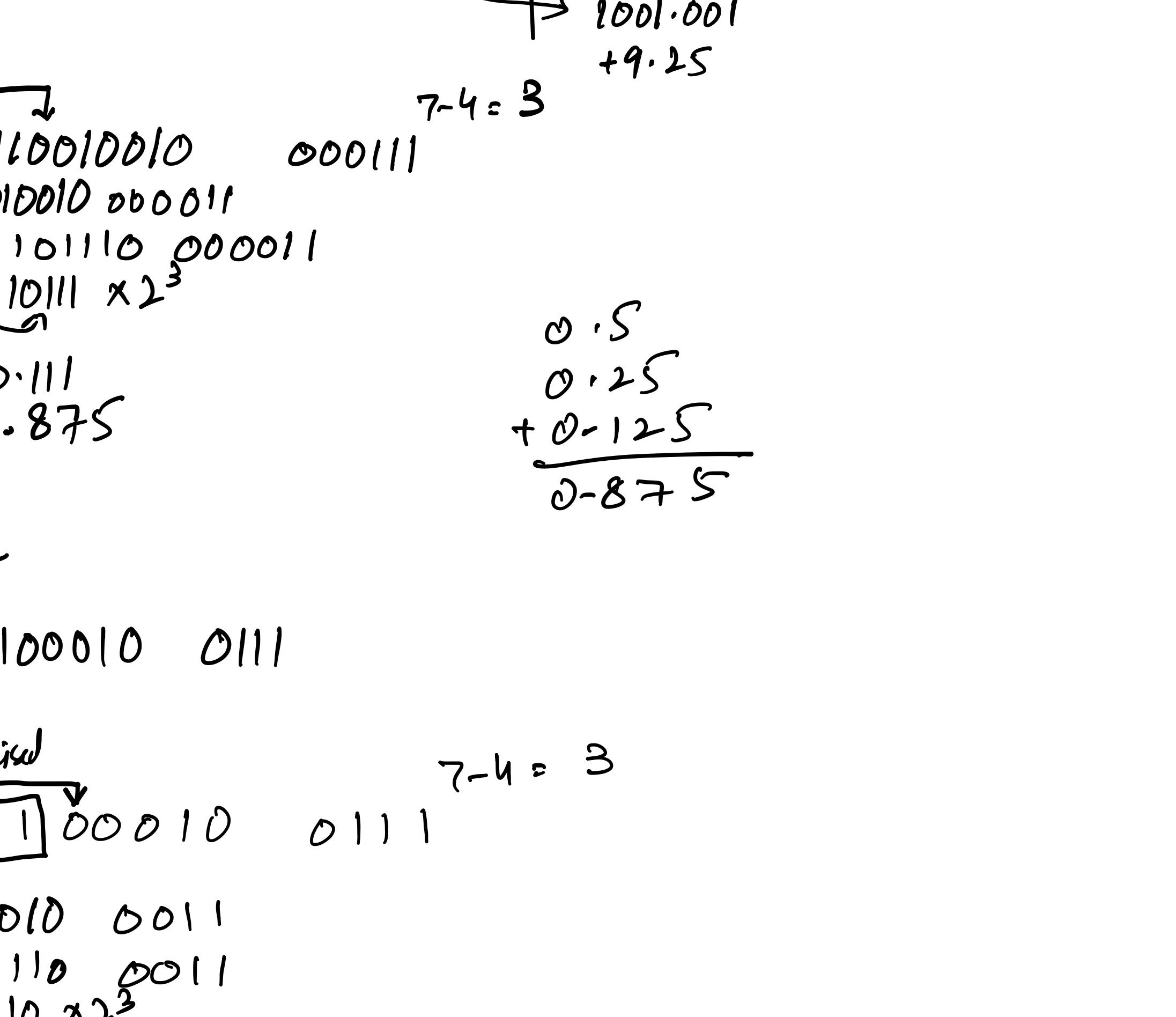
$$(7.8625)_{10} = (111.1001)_2$$

$$\begin{array}{r} 0.5 \\ 0.0625 \\ \hline 0.5625 \end{array}$$

$$\begin{aligned} & (2.5)_{10} \\ \Rightarrow & (10.1)_2 \\ \Rightarrow & (10.1)_2 \\ \Rightarrow & (0.101)_2 \times 2^3 \\ \Rightarrow & 0101 \quad 010 \quad \text{floating point} \end{aligned}$$

$$\begin{array}{l} 2000 \\ 2 \times 10^3 \rightarrow \text{standard} \\ [2] \times [10]^3 \rightarrow \text{Exponent} \\ \begin{array}{l} \text{Significand} \\ \text{(Mantissa)} \end{array} \\ \text{Base} \end{array}$$

$$\begin{aligned} & 10.75 \quad 7.8625 \\ \Rightarrow & 1010.11 \quad \Rightarrow 111.1001 \\ \Rightarrow & 0.101011 \times 2^4 \quad \Rightarrow 0.1111001 \times 2^3 \\ \Rightarrow & \underline{\underline{010101}} \quad \underline{\underline{0100}} \quad \Rightarrow 01111001 \quad 011 \\ \Rightarrow & \text{Mantissa Exp.} \quad \Rightarrow 01111000 \quad 000011 \\ \Rightarrow & 0101011000 \quad 000100 \end{aligned}$$



Solve: +36.5625

10 bits: Mantissa

6 bits: Exponent

$$\begin{aligned} & 36.5625 \\ \Rightarrow & 100100.1001 \\ \Rightarrow & 0.1001001001 \times 2^6 \\ \Rightarrow & 01001001001 \quad 0110 \\ \Rightarrow & 01001001000 \quad 000110 \quad \text{Ans} \end{aligned}$$

$$\begin{aligned} & +ve \\ \Rightarrow & 0100100100 \quad 000110 \\ \Rightarrow & 0.100100100 \times 2^6 \\ \Rightarrow & 100100.1 \\ \Rightarrow & +36.5 \quad \text{Ans.} \end{aligned}$$

-3.125

+3.125

$\Rightarrow 11.001$

$$\Rightarrow 0.11001 \times 2^3$$

$$\Rightarrow 011001 \quad 010 \quad \text{Ans.}$$

$$\Rightarrow 0110010000 \quad 0000010$$

$$\Rightarrow 0110010000 \quad 0000010 \quad +ve$$

$$\Rightarrow 0110010000 \quad 0000010 \quad -ve$$

$$\Rightarrow 0110010000 \quad 0000010 \quad -ve$$