Binary Numbers (1A)

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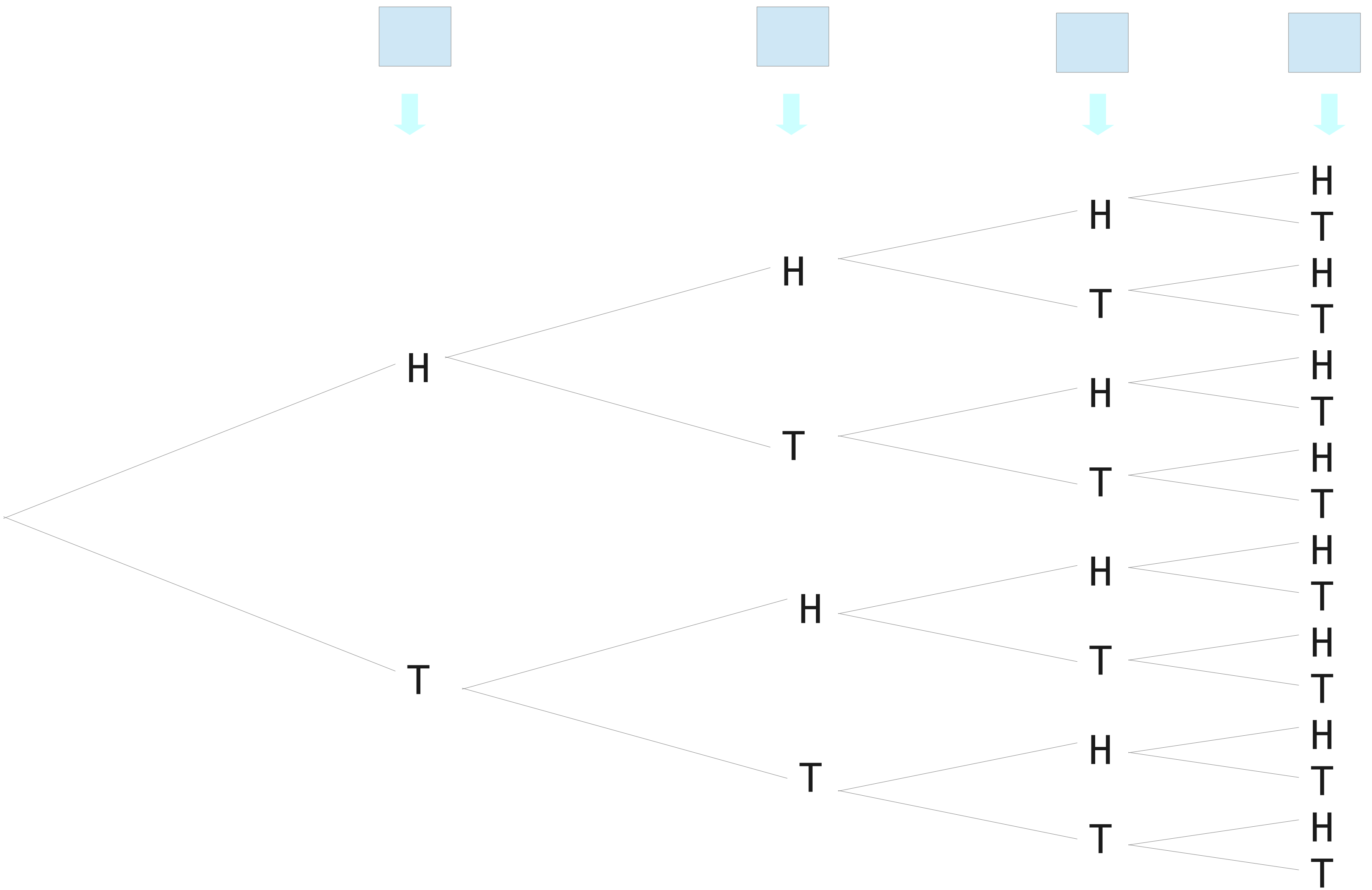
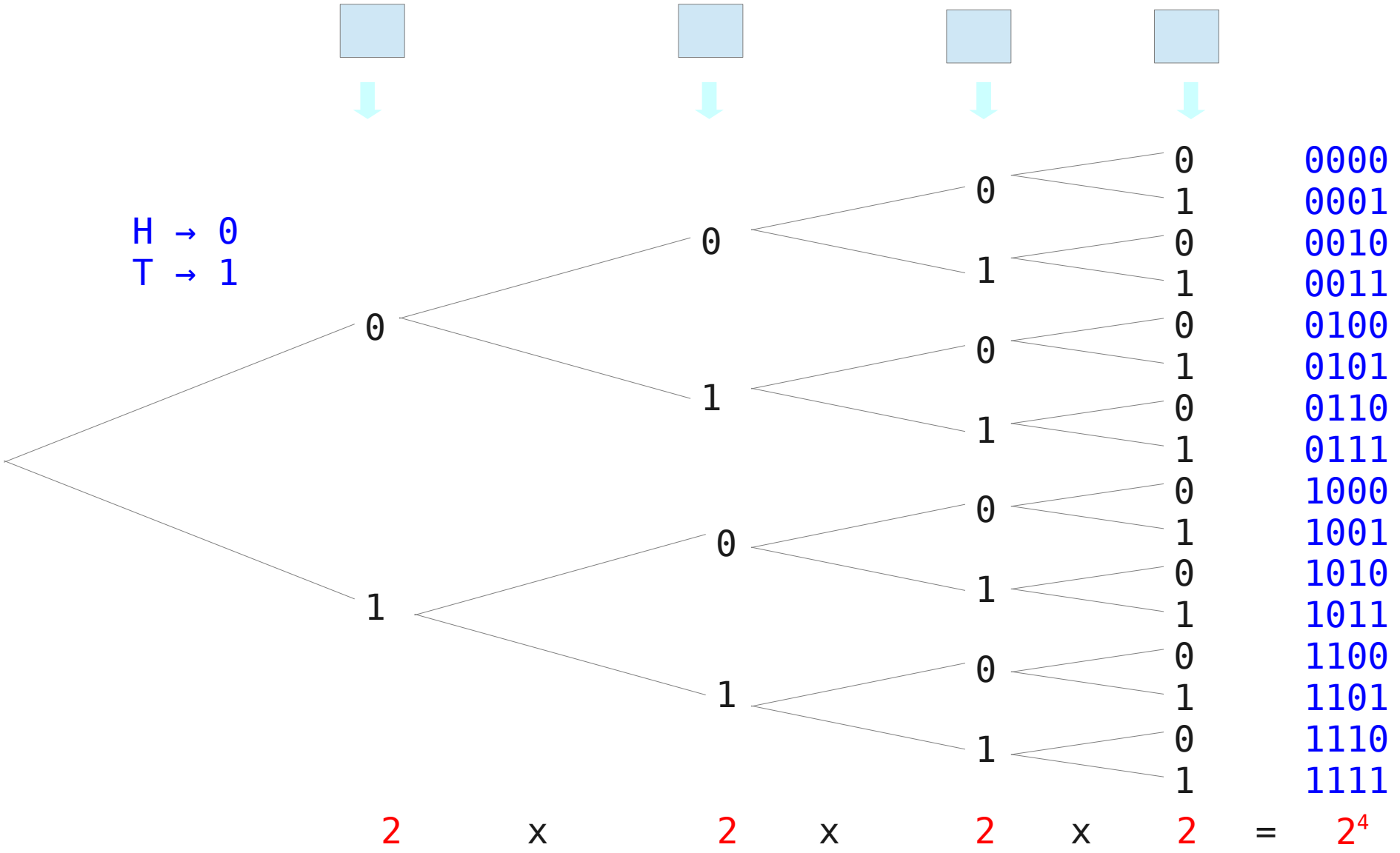
This document was produced by using OpenOffice and Octave.

Coin Tossing

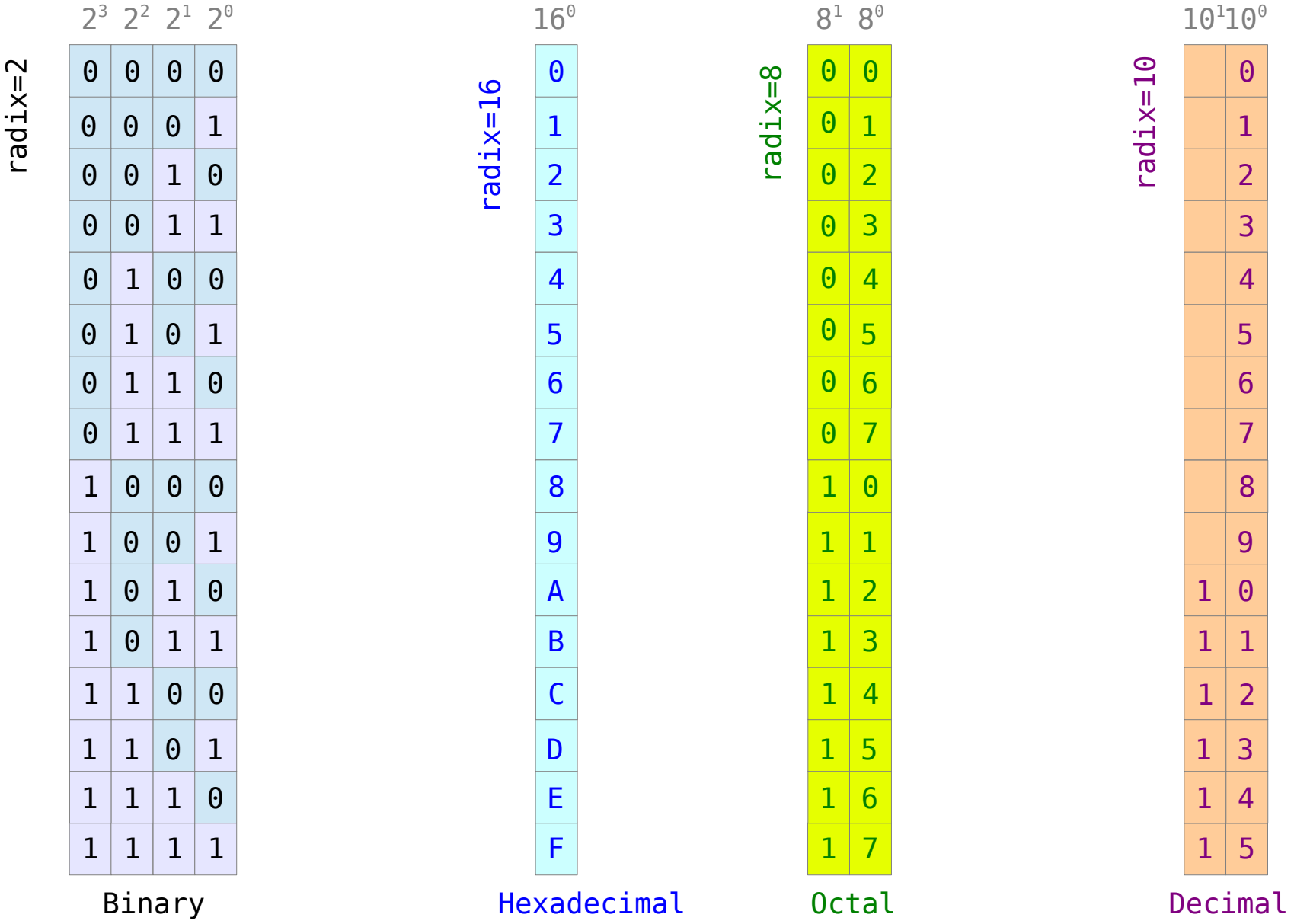


$2 \times 2 \times 2 \times 2 = 2^4$

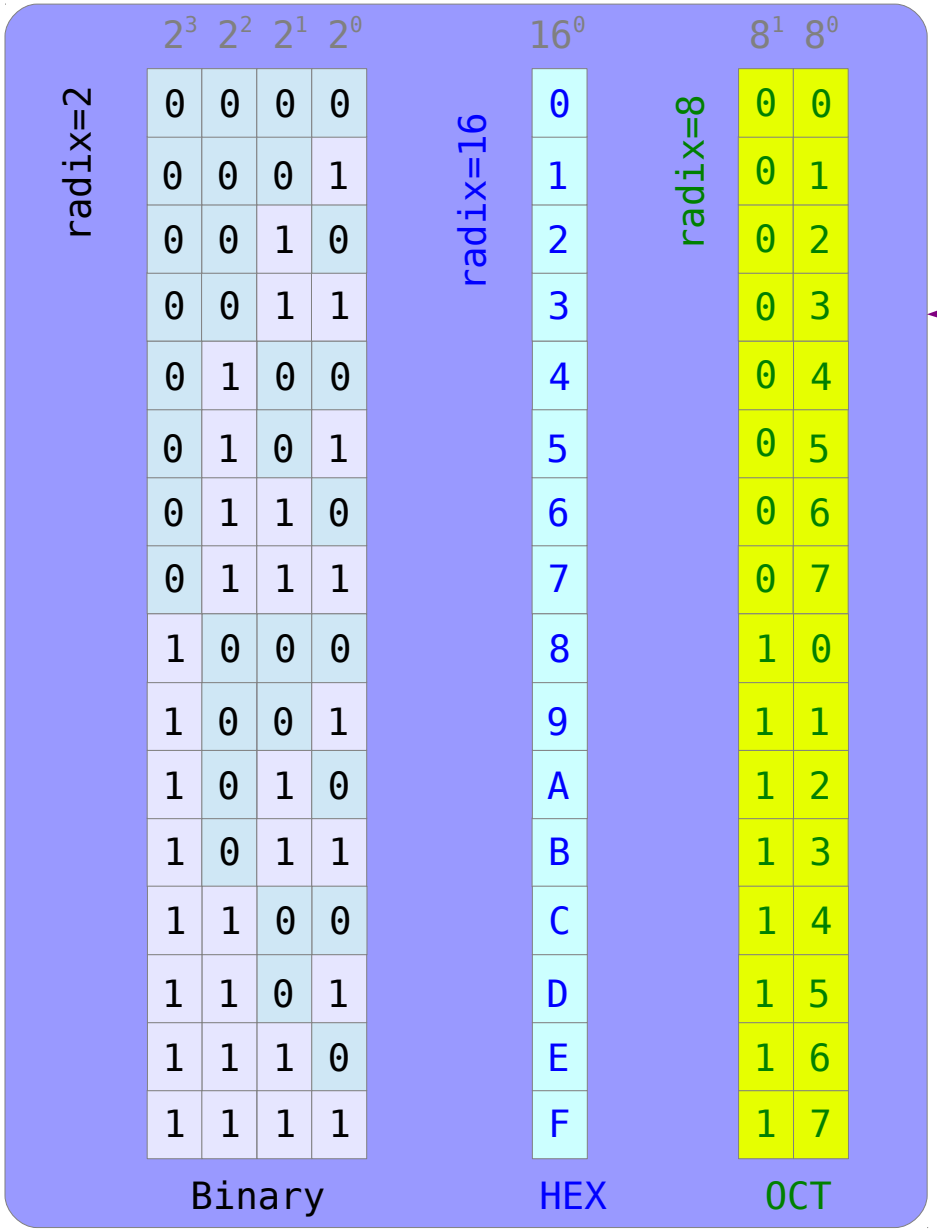
Coin Tossing & Binary Numbers



Number Systems

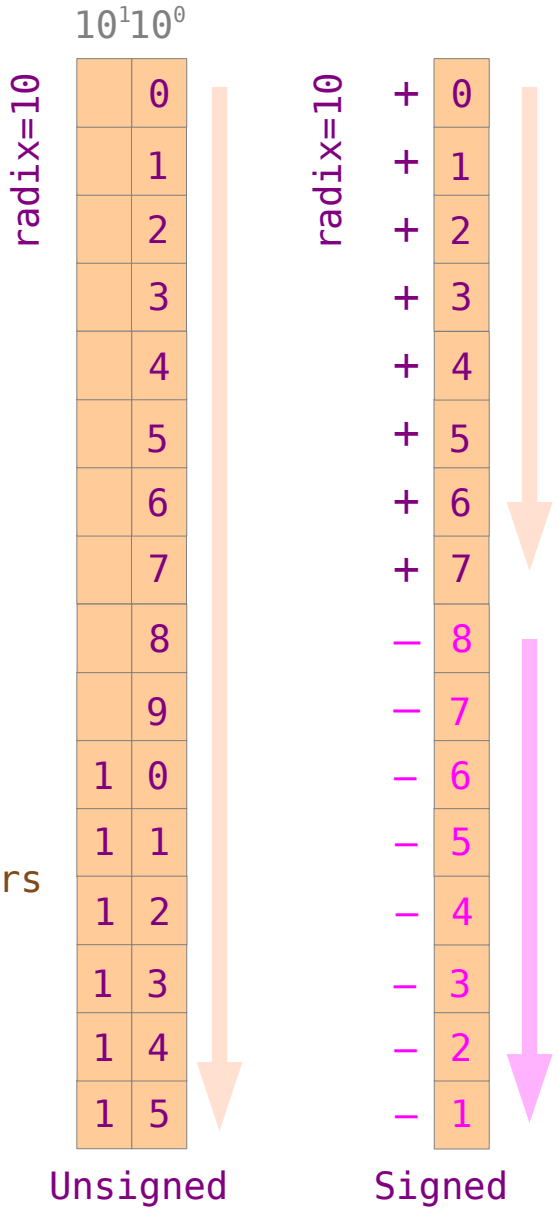


Bit Patterns

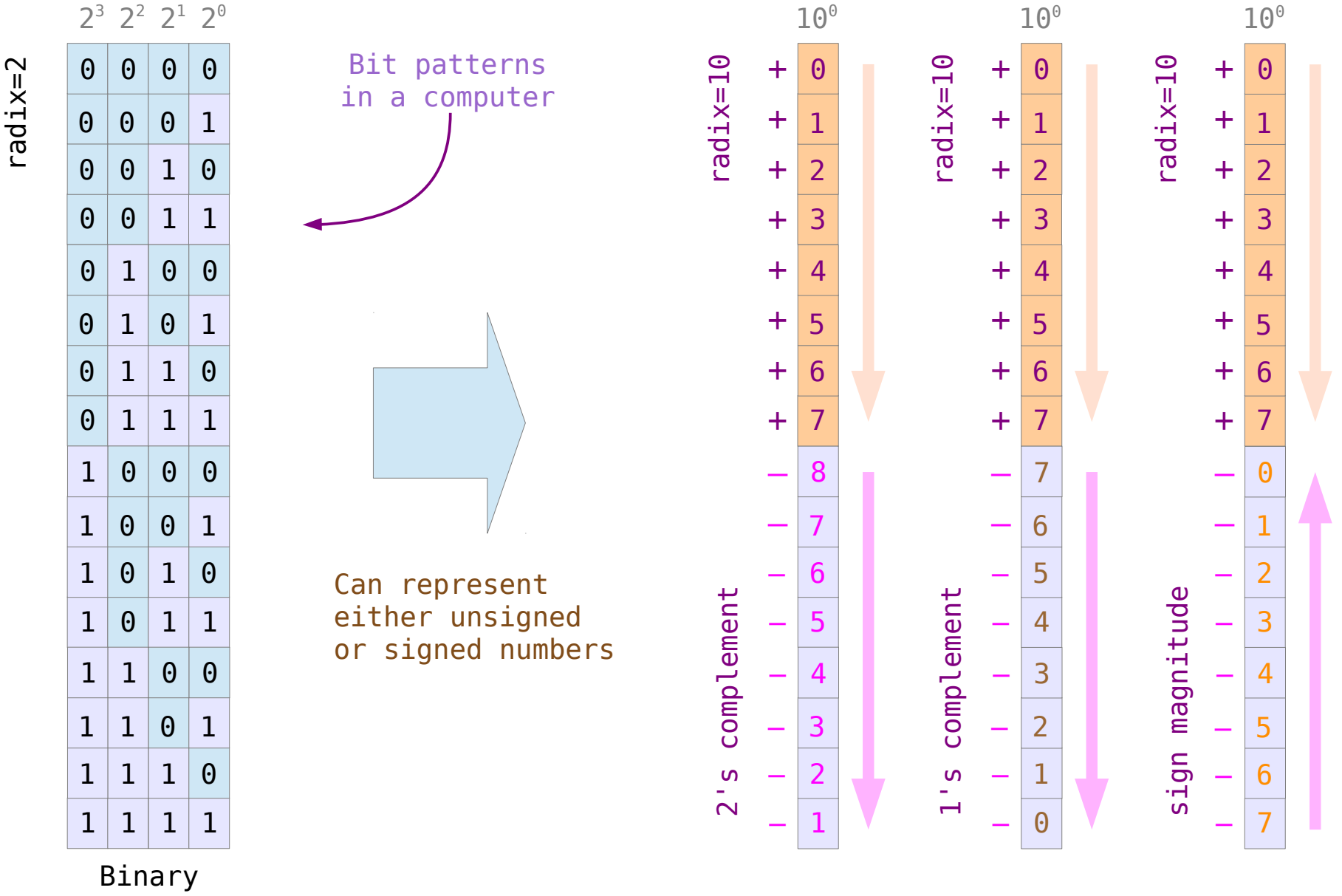


Bit patterns in a computer

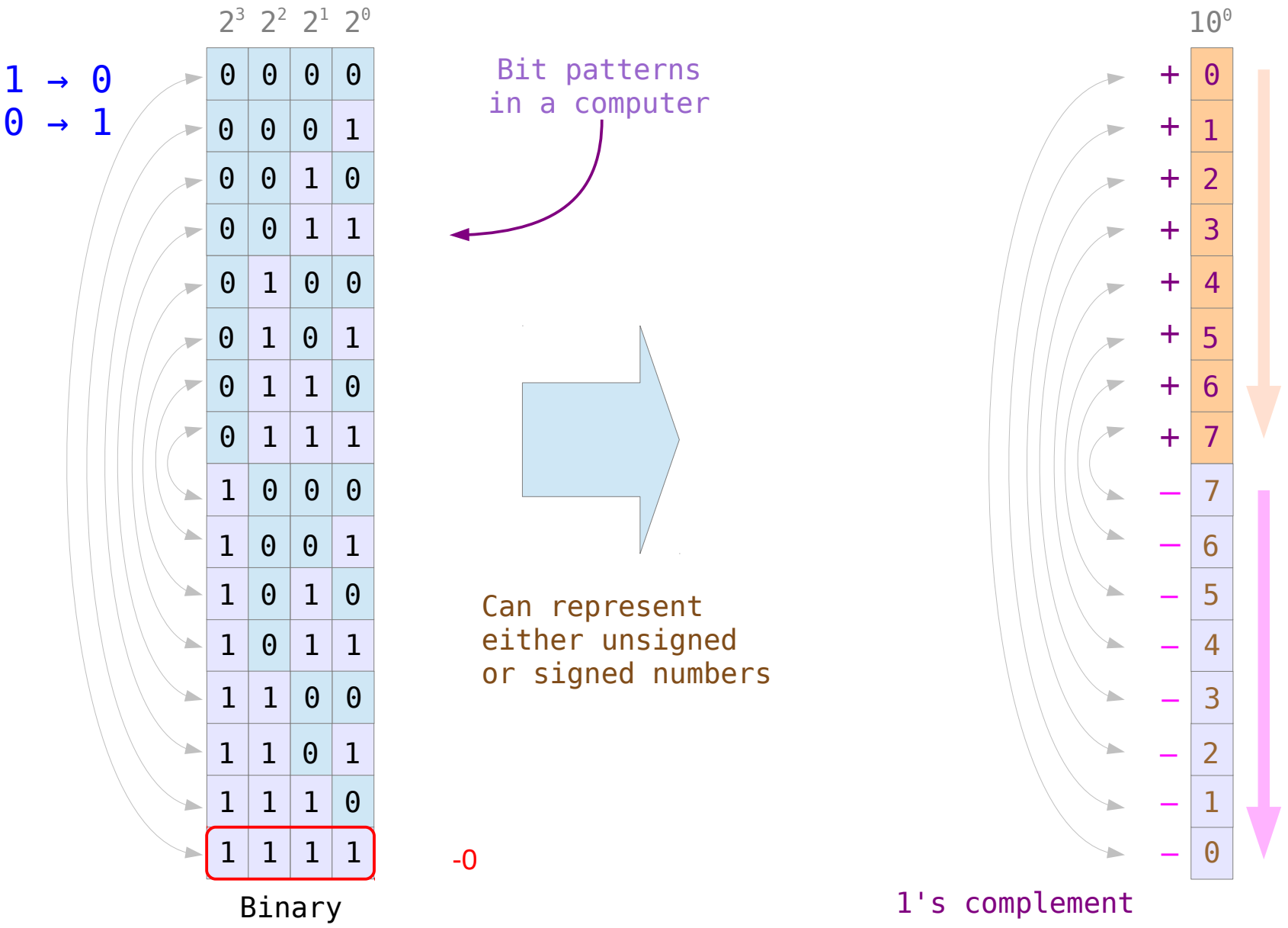
Can represent either unsigned or signed numbers



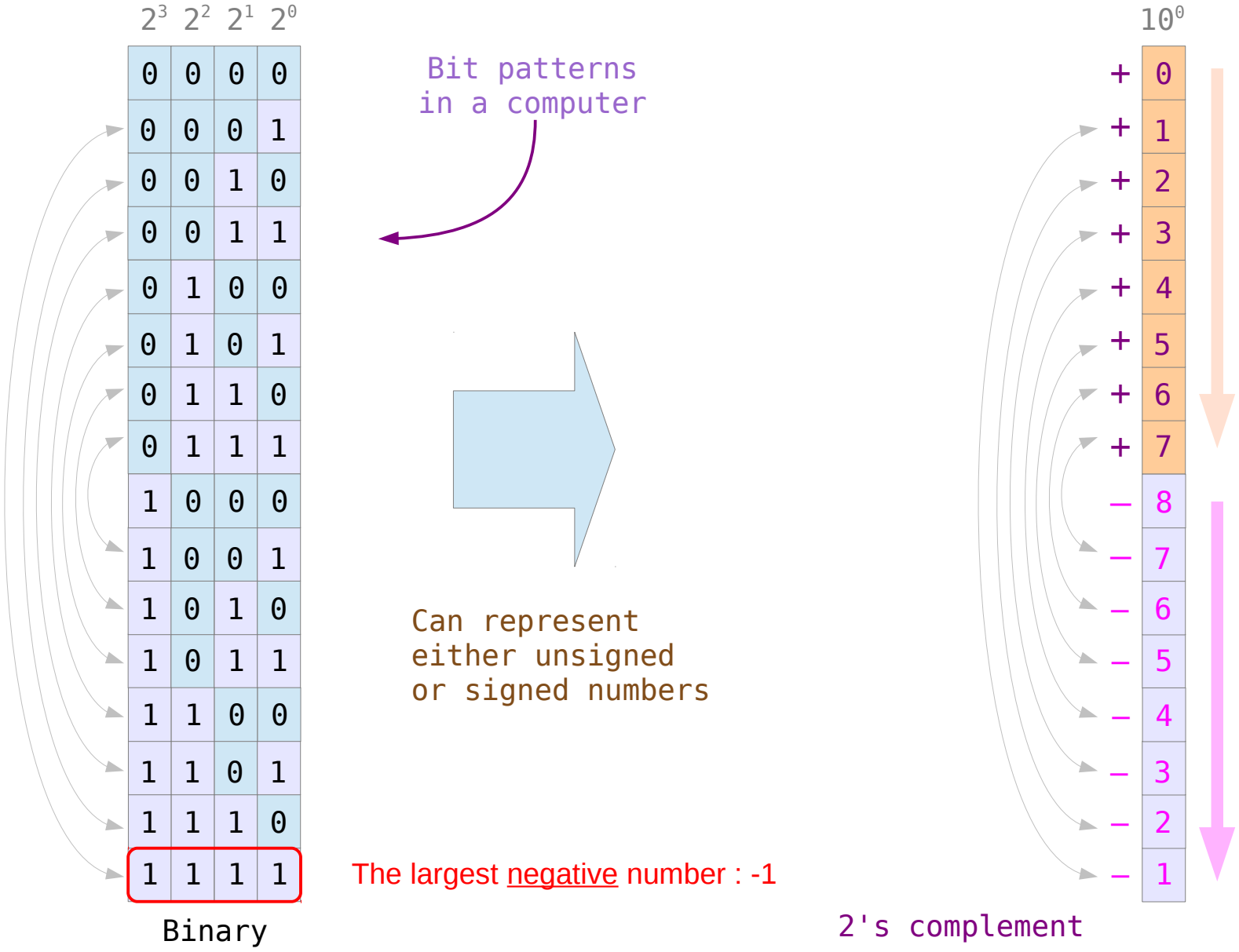
Bit Signed Numbers



1's Complement



2's Complement



Decimal to Binary (1)

$2 \;)\; 14$

$2 \;)\; 7 \quad \ldots \quad 0 \qquad 14 = 2 \cdot 7 + 0$

$2 \;)\; 3 \quad \ldots \quad 1 \qquad 7 = 2 \cdot 3 + 1$

$1 \quad \ldots \quad 1 \qquad 3 = 2 \cdot 1 + 1$

$$14 = 2 \cdot 7 + 0$$

$$14 = 2 \cdot (2 \cdot 3 + 1) + 0$$

$$14 = 2 \cdot (2 \cdot (2 \cdot 1 + 1) + 1) + 0$$

$$14 = 2 \cdot (2 \cdot (2 \cdot 1 + 1) + 1) + 0 \qquad 1 \cdot 2^3$$

$$14 = 2 \cdot (2 \cdot (2 \cdot 1 + 1) + 1) + 0 \qquad 1 \cdot 2^2$$

$$14 = 2 \cdot (2 \cdot (2 \cdot 1 + 1) + 1) + 0 \qquad 1 \cdot 2^1$$

Decimal to Binary (2)

$$14 = 2 \cdot 7 + 0$$

$$14 = 2 \cdot (2 \cdot 3 + 1) + 0$$

$$14 = 2 \cdot (2 \cdot (2 \cdot 1 + 1) + 1) + 0$$

$$14 = 7 \cdot 2 + 0$$

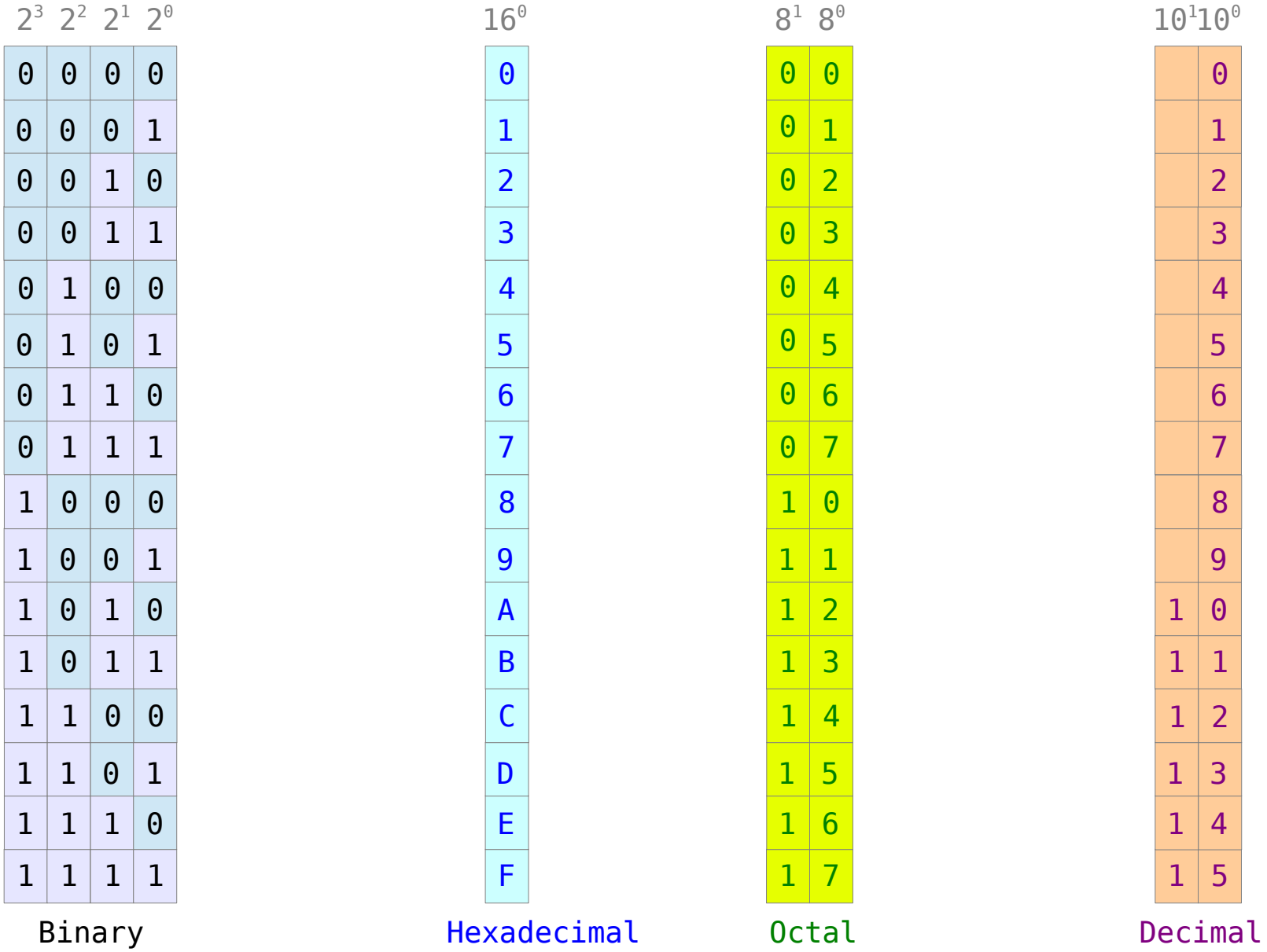
$$14 = (3 \cdot 2 + 1) \cdot 2 + 0$$

$$14 = ((1 \cdot 2 + 1) \cdot 2 + 1) \cdot 2 + 0$$

$$\left(\cdots \left(\left(A_{n-1} r + A_{n-2} \right) r + A_{n-3} \right) r + \cdots + A_1 \right) r + A_0$$

A_{n-1}	A_{n-2}	A_{n-3}		$\cdots$		A_1	A_0

Laplace Equation



Laplace Equation

Laplace Equation

References

[1] http://en.wikipedia.org/
[2] http://planetmath.org/
[3] M.L. Boas, “Mathematical Methods in the Physical Sciences”