Switching Circuit & Logic Design

Lecture 5 : Introduction to number theory

Things to cover

- Number theory

Book : Fundamentals of Digital Circuits, A. Anand Kumar

Number Theory

- Base / radix
- Decimal
- Binary
- Octal
- Hexadecimal

Counting with Binary

- 0, 1
- 00, 01, 10, 11
- 000, 001, 010, 011, 100, 101, 110, 111
- ...

Conversion of Decimal to Binary

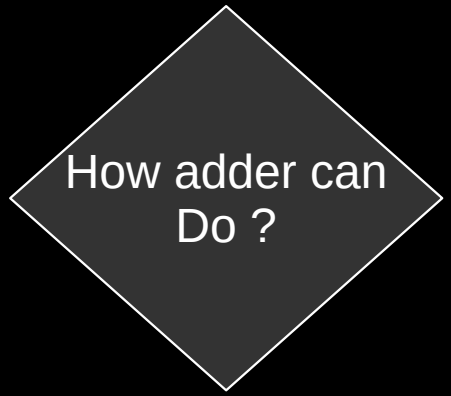
- Before decimal point
- After decimal point

Addition in Binary system

- 0 + 0 = 0
- 0 + 1 = 1
- 1 + 0 = 1
- 1 + 1 = 10 : Carry 1

Subtraction in Binary System

- 0 – 0 = 0
- 1 – 1 = 0
- 1 – 0 = 1
- 0 – 1 = 1 with a borrow of 1



Negative decimal number

- Sign bit
- 1’s complement
- 2’s complement

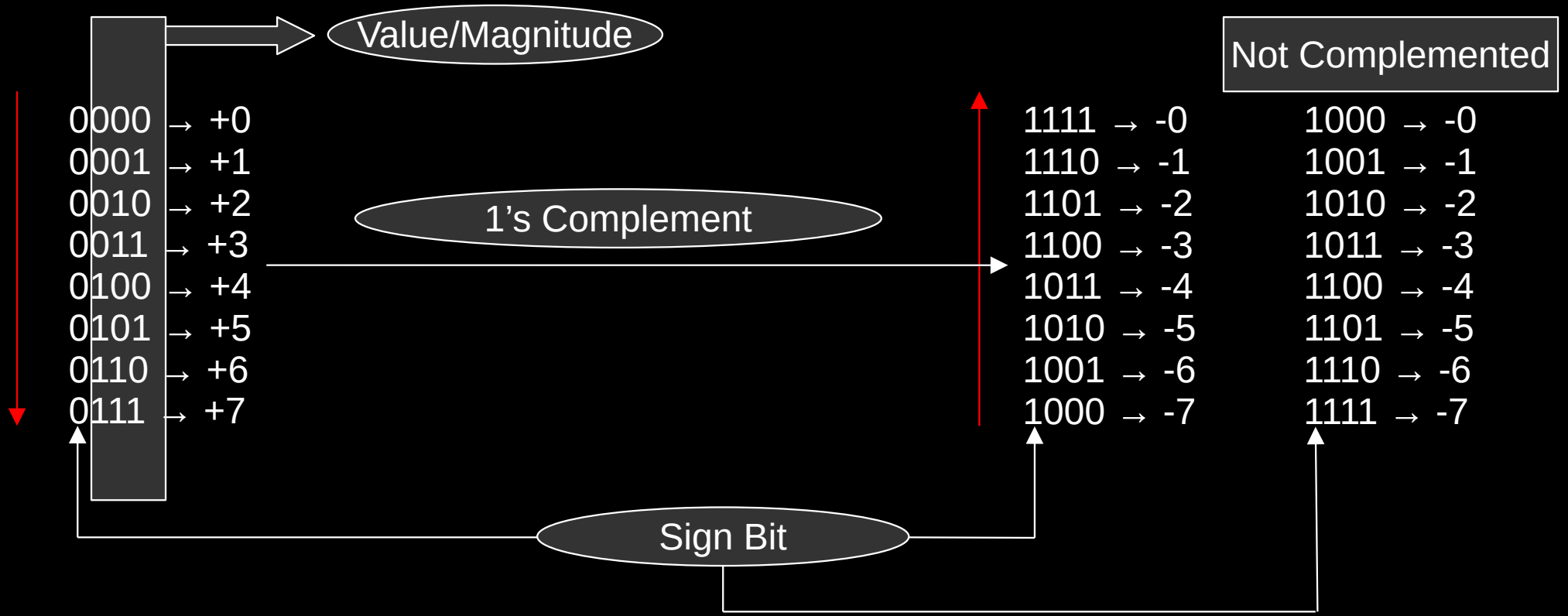
Sign bit

- Most significant bit (MSB)
- Least significant bit (LSB)
- Unsigned and signed

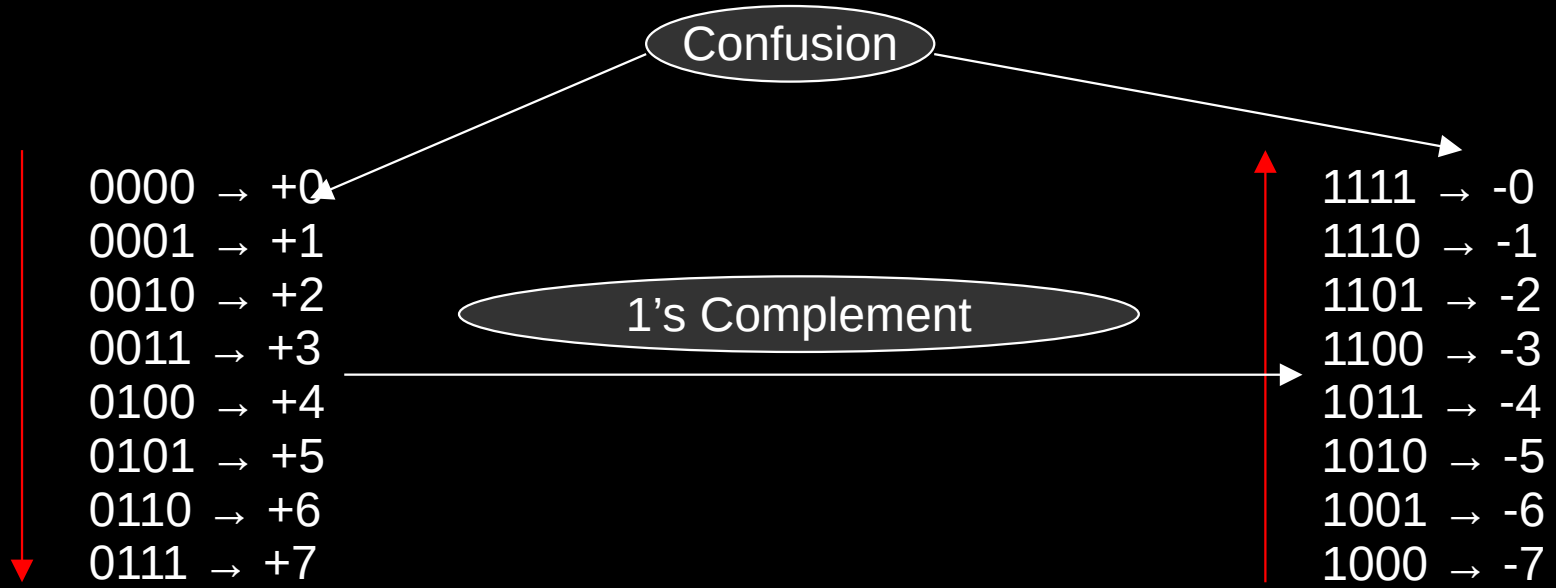
1’s Complement

1→ 0
0 → 1

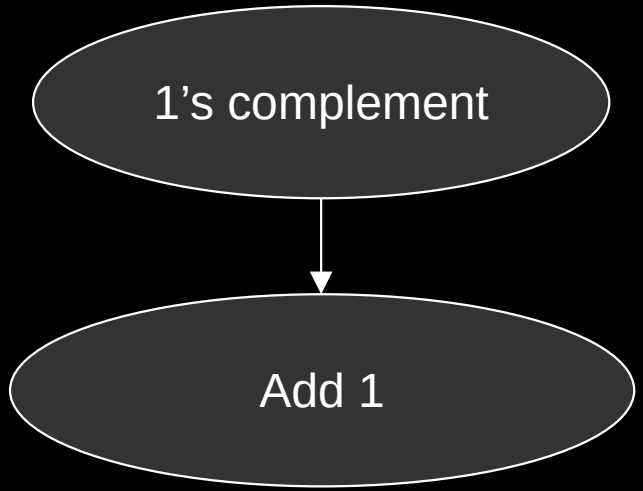
1’s Complement



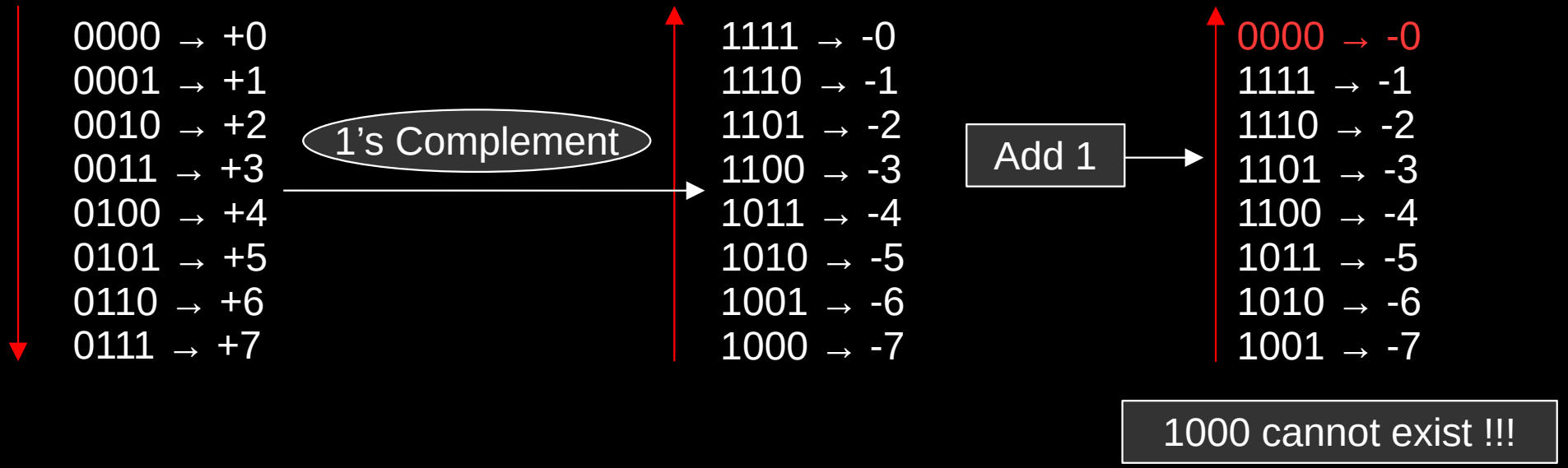
1’s Complement



2’s Complement



2’s Complement



Other number systems

- Decimal to octal, hexadecimal
- Octal to decimal
- Hexadecimal to decimal