

I) NumbersII) A different paradigm: hexadecimal

Decimal: $N = a 10^3 + b 10^2 + c 10 + d$

Binary $N = a 2^3 + b 2^2 + c 2 + d$

Hexadecimal $N = a 16^3 + b 16^2 + c 16 + d$

The use of hexadecimal numbers:

binary number N

$$N = \underbrace{(1011)}_B \underbrace{1000}_8 \underbrace{1001}_9 \underbrace{0001}_1)_2$$

$$N = (B891)_{16}$$

$$= \# B891$$

Reverse,

Take $N = \# 8 F A$

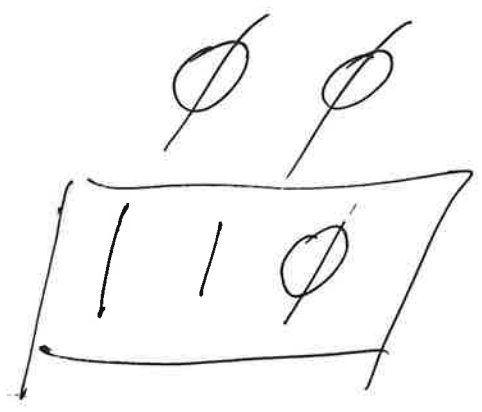
8 F A

$N = (1000 \quad 1111 \quad 1010)_2$

III) Texts

Conversion

a	$\emptyset$
b	1
c	1 $\emptyset$
d	1 1



a a

ambiguous

→

1	1 $\emptyset$
b	c
11	$\emptyset$
d	a

③

This representation

a	$\emptyset$
b	1
c	1 $\emptyset$
d	11

is ambiguous.

Instead, I give exactly 2 bits
to each letter:

a	$\emptyset \emptyset$
b	$\emptyset 1$
c	1 $\emptyset$
d	11



For a larger alphabet (English)
ASCII: 8 bits
↓
256 types of characters

today, ASCII is not enough ⁽⁴⁾
as it only defines 256 characters.

UNICODE : 156,000 characters.

	# of characters	# of bits/character
ASCII	256	8
UNICODE	156,000	18

N- such that

$$2^{N-1} \leq 156,000 < 2^N$$