



Next Topic :

Sign Extension



Program: Hiring

int a;
 4 bits

no. of applicants
max(a) = 15

A lot of people apply

long int a;
 8 bits



Digital Logic





Next Topic :

Sign Extension

For Unsigned Numbers



4 bits

1101
13

5 bits

0110
13

6 bits

001101
13

$a_n a_{n-1} \dots a_1$, $\xrightarrow{\text{copy}}$ 000 $a_n a_{n-1} \dots a_1$

n bits n+3 bits



4 bits

0011

1100

12

7 bits

0000011

0001100

12



Next Topic :

Sign Extension

For Signed Numbers





Next Topic :

Sign Extension

For Signed Numbers in Sign Magnitude
Representation



Digital Logic

4 bits

$$\begin{array}{r} 0010 \\ \underbrace{\quad\quad}_{+2} \\ +2 \end{array}$$

5 bits

$$\begin{array}{r} 00010 \\ \underbrace{\quad\quad}_{+2} \\ +2 \end{array}$$

6 bits

$$\begin{array}{r} 000010 \\ \underbrace{\quad\quad}_{+2} \\ +2 \end{array}$$

$$\begin{array}{r} 0101 \\ \underbrace{\quad\quad}_{+5} \\ +5 \end{array}$$

$$\begin{array}{r} 00101 \\ \underbrace{\quad\quad}_{+5} \\ +5 \end{array}$$

$$\begin{array}{r} 00101 \\ \underbrace{\quad\quad}_{+5} \\ +5 \end{array}$$



Digital Logic

4 bits

1010
-2

1111
-7

5 bits

10010
-2

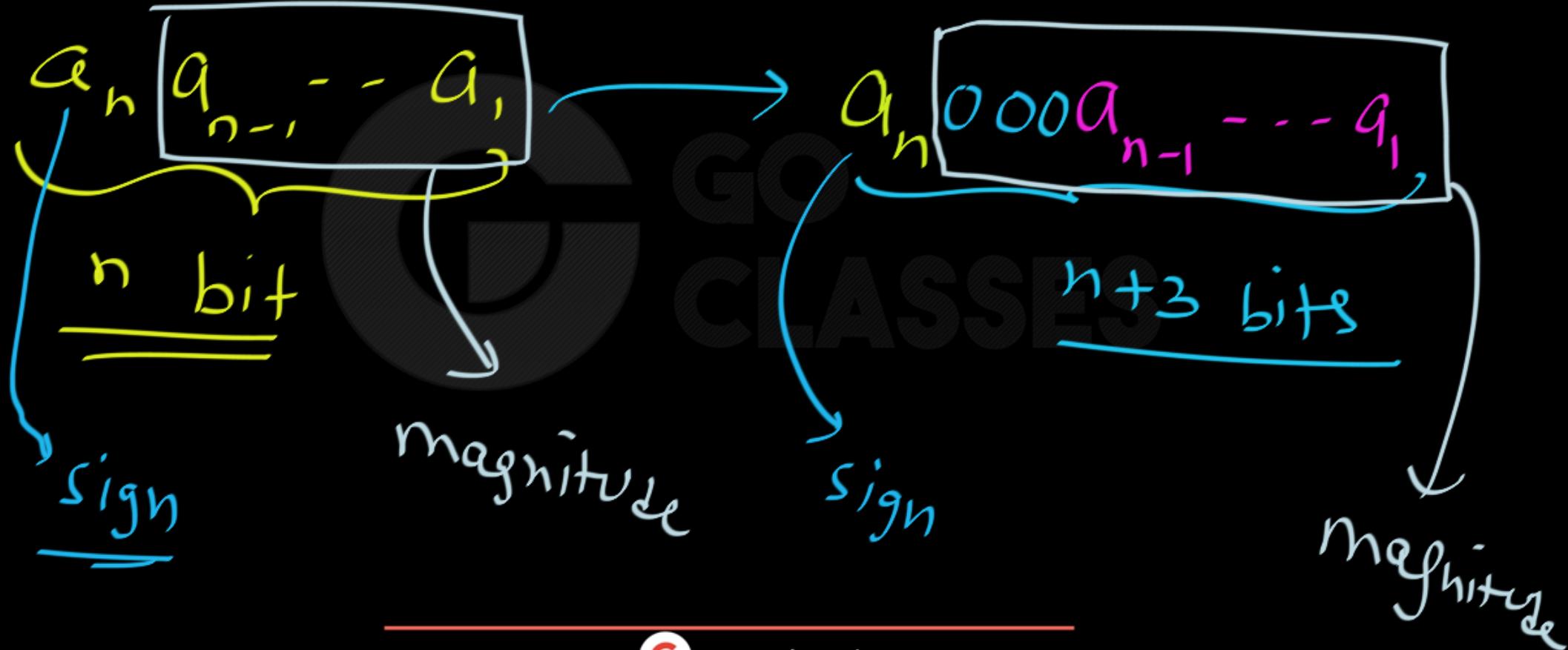
10111
-7

6 bits

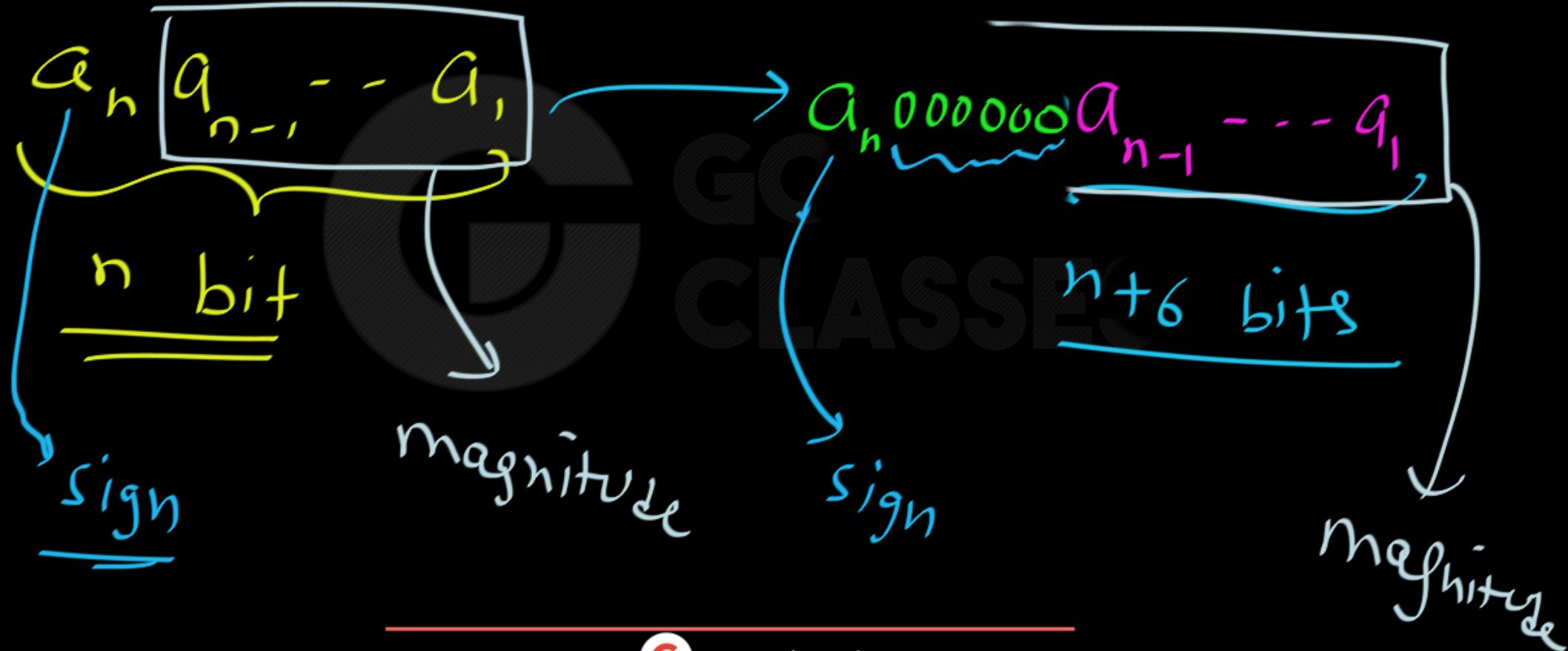
100010
-2

100111
-7

Signed Numbers in Sign Mag Rep



Signed Numbers in Sign Mag Rep





Next Topic :

Sign Extension

For Signed Numbers in 1's Complement

Representation

4 bits

0110

6

1011

-4

5 bits

00110

11011

-4

6 bits

000110

111011

-4

+4

00100

-4

11011



Digital Logic

4 bits

0111

-0

0010

+2

5 bits

1111

-0

00010

+2

6 bits

111111

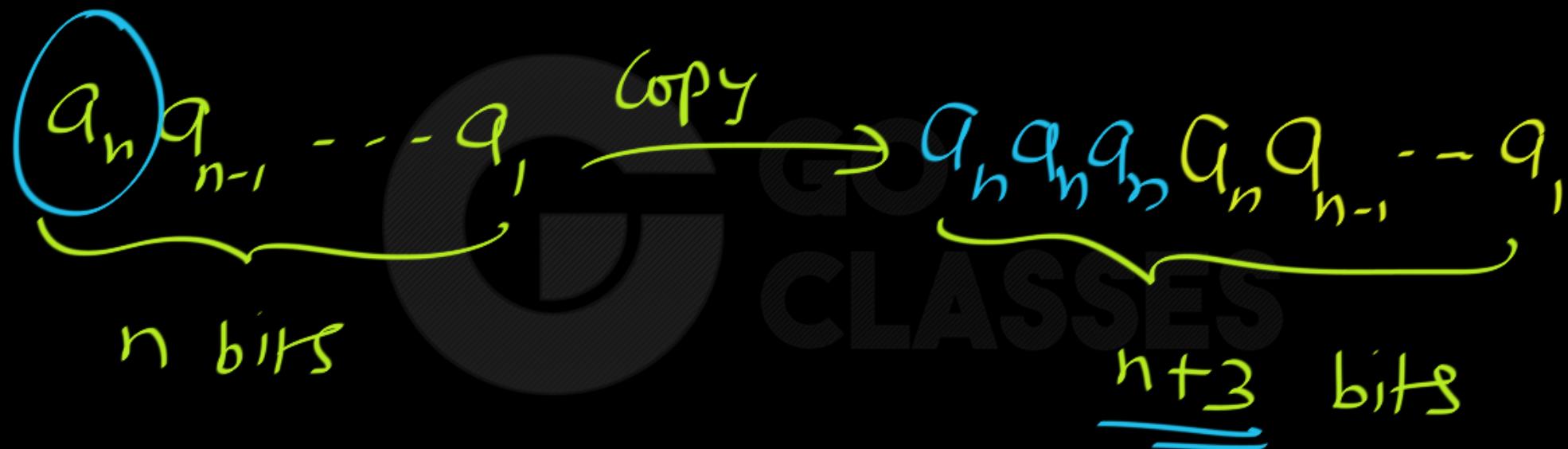
-0

000010

+2



In 1's Comp :





In 1's Comp :





Next Topic :

Sign Extension

For Signed Numbers in 2's Complement

Representation



4 bits

0011
+3

1010
-6

5 bits

00011
+3

11010
-6

6 bits

000011
+3

111010
+6



4 bits


-1


-8

5 bits


-1


-8

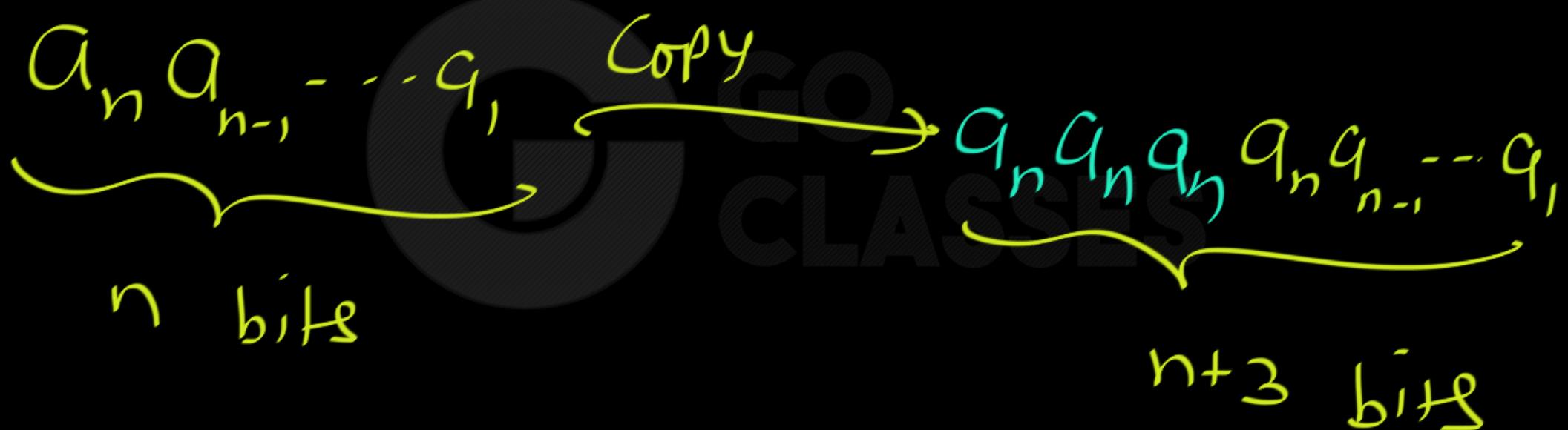
6 bits


-1


-8

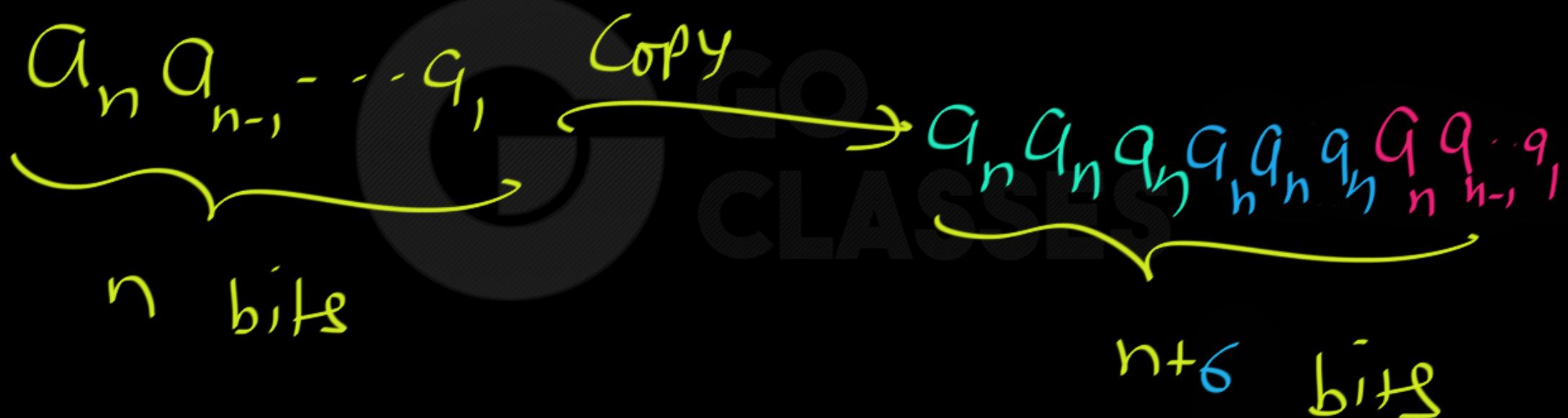


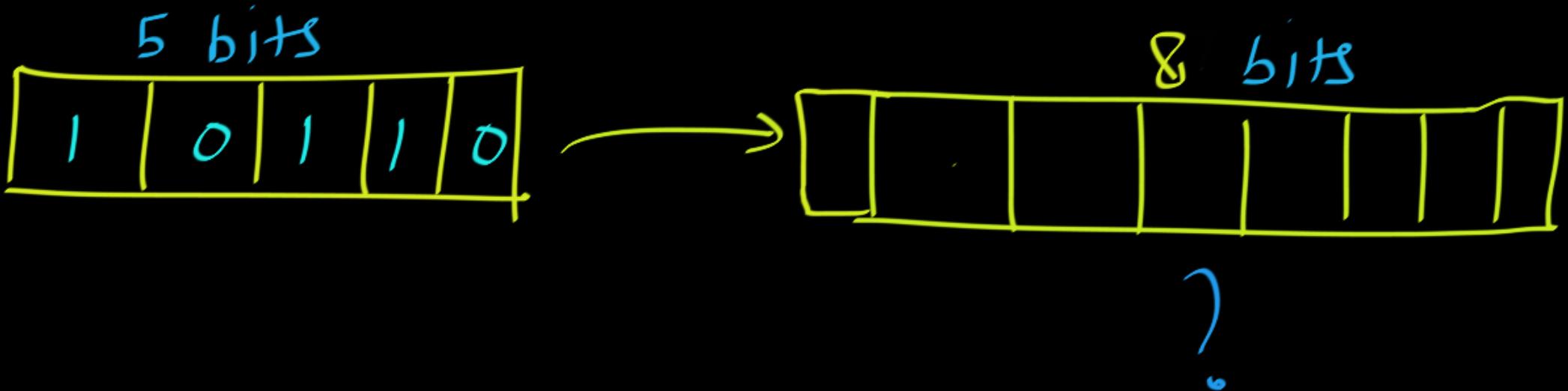
In 2's Comp : (for signed numbers)

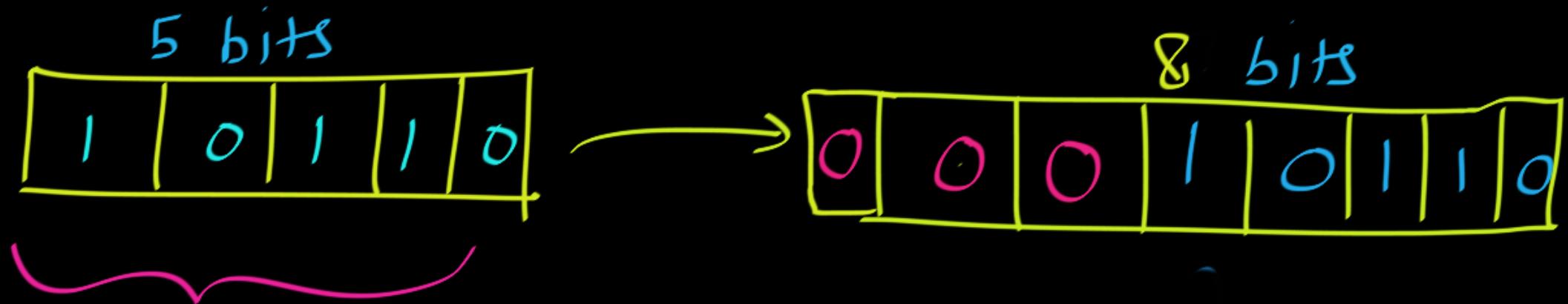




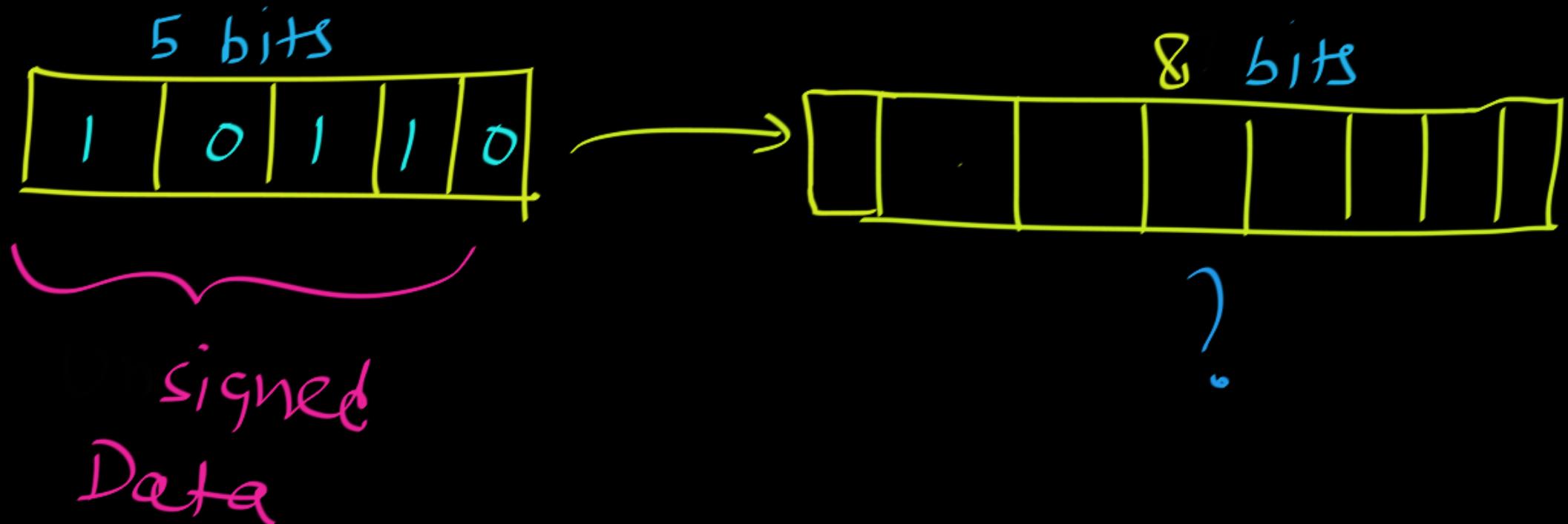
In 2's Comp : (for signed numbers)

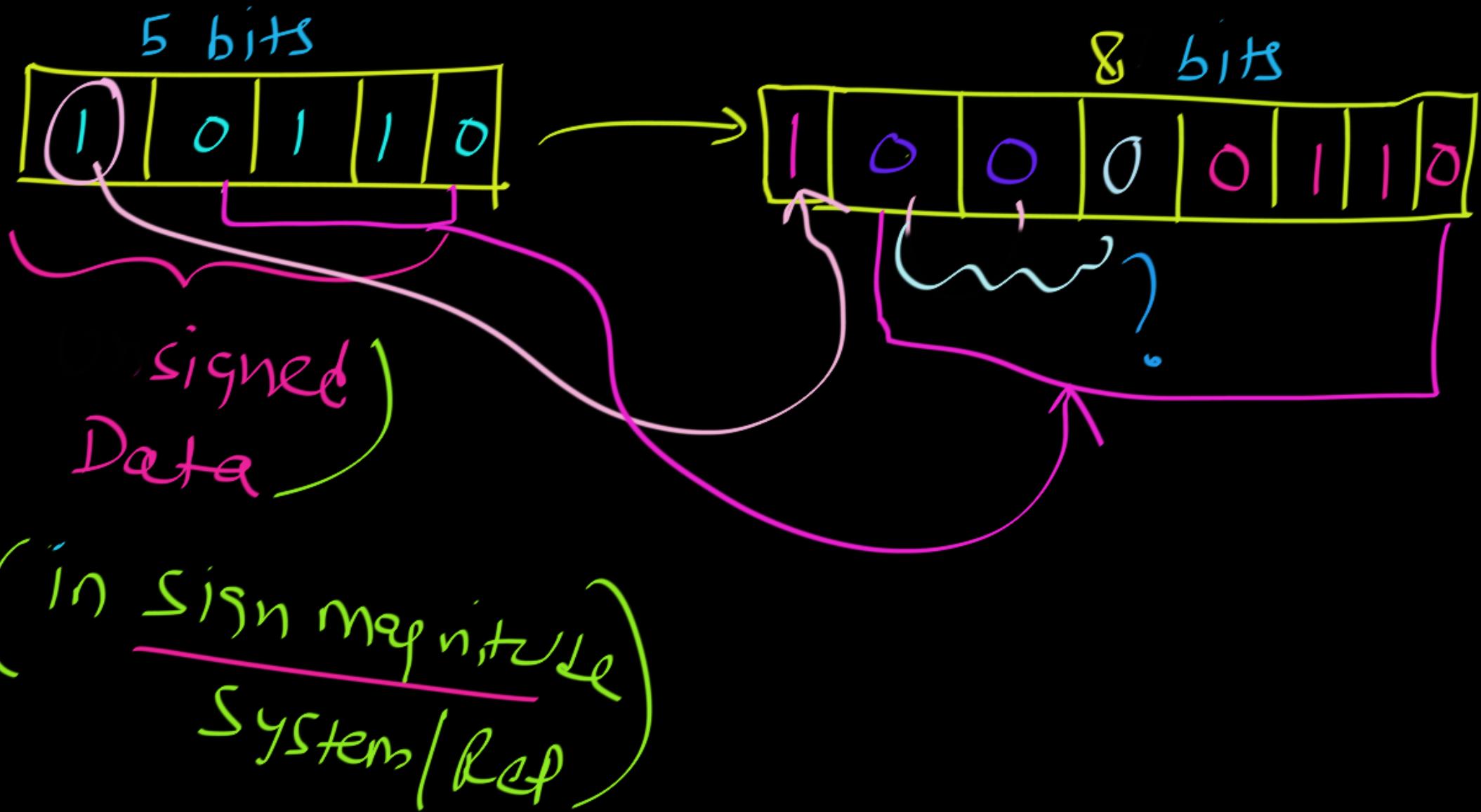


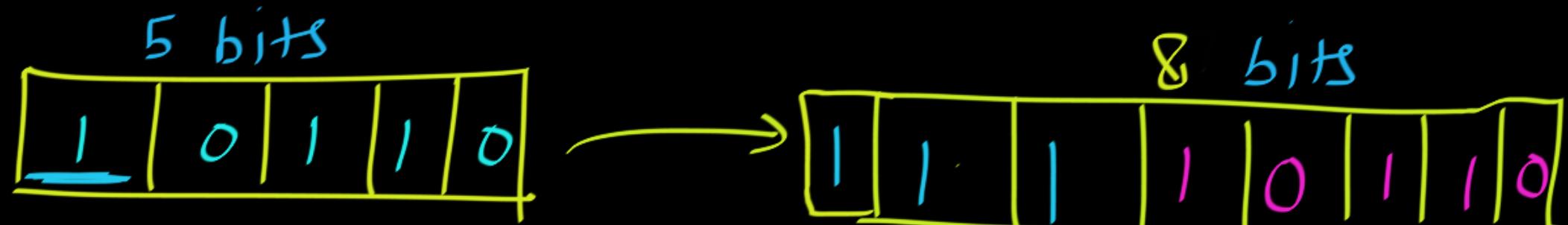




Unsigned
Data

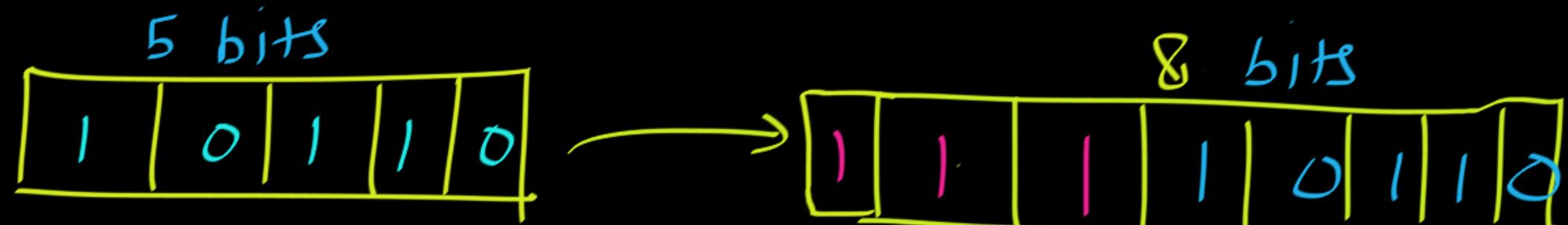






signed
Data

(in is Comp Rep)



signed
Data
(in 2's comp
Rep)