bit - manipulation.c

a = 60 → 0011 1100

b = 13 → 0000 1101

bitwise AND
```
  0011 1100
& 0000 1101
-----------
  0000 1100
  8 4 2 1
```
$(0000\ 1100)_2 \rightarrow 8+4=12$

OR
```
  0011 1100
| 0000 1101
-----------
  0011 1101
  32 16 8 4 2 1
```
$\rightarrow (61)_{10}$

$32+16+8+4+1=61$

$\sim 60 \rightarrow \sim 0011\ 1100 \rightarrow 1100\ 0011$

128 64 21

$(1100\ 0011)_2 \rightarrow 195$ wrong!

0.....00111100 → 32 bits

sign

24 0s

1.....1100 0011

24 1s

-2^{31} ... $2^7\ 2^6\ 0\ 0\ 0\ 0\ 0\ 2^1\ 2^0$

1 ... 1 1 0 0 0 0 0 1 1

24 1s

$-2^{31} + 2^{30} + 2^{29} - \dots + 2^7 + 2^6 + 0 + 0 + 0 + 0 + 2^1 + 2^0$

-62

Shifting

1) left Shift

~~00~~11 1100 << 2

128 64 32 16

1111 0000 → 128 + 64 + 32 + 16 = 240

2) Right Shift

00 11 11 ~~00~~ >> 2 → 0000 1111 →

$-2^{(15)}_2$

2.1

0x25B9D2 → 0010 0101 1011 1001 1101 0010

2 5 B 9 D 2

1010111001001001

A E 4 9

2,2 | $x = 2^h$ $h = 23$

$h = i + 4j$ $0 \le i \le 3$ j – Os

$i \rightarrow 2^i$ – first num

$23 = 4 \cdot 5 + 3$ (Os, $2^3 = 8$)

$2^{23} \rightarrow 0x800000$

2,12

0x87654321 = X

A) X & 0xFF

& 10000111011001010100001100100001

0 ... 000111111111

0 ... 00100001

↓

0x00000021

B) x = 0x87654321

X ^ ~0xFF

~0xFF = 111... 0000 0000

^ 10000111011001010100001100100001

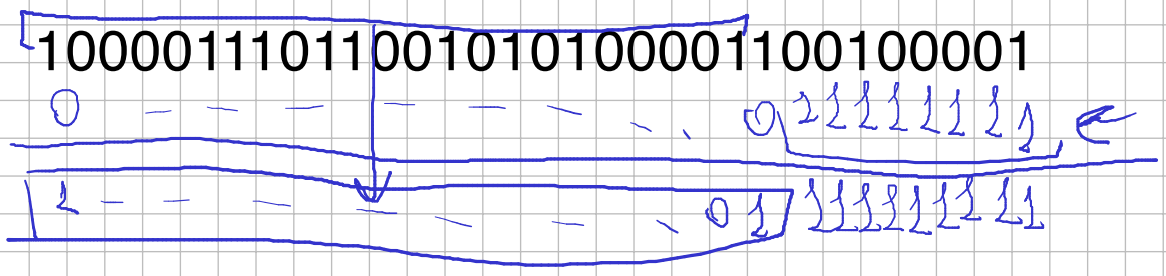
1... 11000000

00100001

21

c) $x = 0x87654321$

$x \mid 0xFF$



$0x87654FFF$.