1) int a = 9;

4 bytes

32 bits

9 ✓

a

1001 => 4 bits

| 0 — 0 | 00 — 0 | 00000 | 00001001 | ✓

32 bits

1) Binary (0's & 1's)

2 | 9
2 | 4 - 1
2 | 2 - 0
2 | 1 - 0
0 - 1

↓

100ϕ

R => 1001 (Binary)

2) int a = 8

| 0 0 0 ——— . . 0 1000 |

32 bits

2 | 8
2 | 4 - 0
2 | 2 - 0
2 | 1 - 0
0 - 1

↓

0001

1000 (Binary)

3) character

char ch = 'a' → ASCII

1byte = 8 bits

97

| 0 1 1 0 0 0 0 1 |

8 bit

1) Binary

2 | 97
2 | 48 - 1
2 | 24 - 0
2 | 12 - 0
2 | 6 - 0
2 | 3 - 0
2 | 1 - 1
0 - 1

↓

1000011

←

1100001

?

ch compiler ch ch ch

integer

| ___ ___ ___ 00001000 |

| 0 1 1 0 0 0 0 1 |

Datatype

int a

char

+ve numbers

-ve ? → Memory
→ Print }

1> Memory

MSB LSB

| 0 0 0 0 — 1 0 0 0 |

0 -> +ve number

1 -> -ve number

int a = -4

1> -ve sign ignore

2> Binary form

3> 1's complement

4> 2's compliment

4

BF | 0 0 0 ——— 0 0 0 1 0 0 |

0 ⇒ 1

1 ⇒ 0

1's | 1 1 1 1 1 1 1 1 — 1 1 1 1 1 0 1 1 |

+1

1 1 1 1 1 1 1 1 100

2 | 4
2 | 2 - 0
2 | 1 - 0
0 - 1

001

0100

MSB -ve

| 1 1 1 1 1100 |

print (-4)

1111 ——— 1100

1's 0000 ——— 0011

2's 000 1

0100

-4

2> int a = -5;

memory store , print

1> 5

2> 0101 | 00. -- 000101 |

3> 1's | 111 - 111010 |

+1

4> 2's | 1 1 1 1 1011 | ✓

MSB -ve

2 | 5
2 | 2 - 1
2 | 1 - 0
0 - 1

101

101

1's

2's

Print | 1111 1011 |

1's 0000 0100

+1

00101

-5

1) unsigned (+ve)

unsigned int a = -12

1) 12

2) 001100

3) 110011

4) 1 111 0100

32

$2^{32} + 2^{31}$

(-12)

| 1111 0100 |

$2\,|\,12$
$2\,|\,6 - 0$
$2\,|\,3 - 0$
$2\,|\,1 - 1$
$0 - 1$

0011
1100

32+16+8+1

$2^5\ 2^4\ 2^3\ 2^2\ 2^1\ 2^0$
111001

32+16+8+4+2+1 ✓

$2^{32} - 12$

4294967296-12 ✓

2) unsigned int a = -11

Homework . .

store ✓
print ✓

$2^{32} - 11$

- 85

```
int num=123458;
✓char ch=num;
cout<<ch<<endl;
```

int -> 4 bytes -> 32 bits
ch -> 1 bytes -> 8 bit

1) BR -> 00000000 00000001 11100010 01000010

2) ch = 01000010 = 66 ->'B'

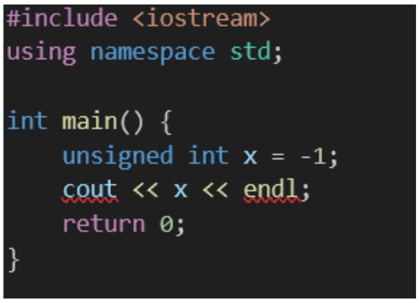
num — 32 — — — ⊖

ch = ~~####~~ 67 -> c

ch - C//

Homework

Question1:



```
#include <iostream>
using namespace std;

int main() {
    unsigned int x = -1;
    cout << x << endl;
    return 0;
}
```

Question2: Convert -25 to its 32-bit 2's complement binary form. Then interpret it as an unsigned integer.