5 < `a´

char

Whole number

Data Type

1. Whole Number "Integers"

```
int   x1
      x_1
      x
```

data type — variable name

Absolute 1. has to start with a letter or an underscore

Absolute 2. include lower, upper, numbers, or underscore only.

* 3. variables must be semi descriptive

```
x1 = 4.9a + r2 - d5
```

Absolute 4. Variables must be unique

```
char x1;
int x1; // Redefine error
int x1 /
```

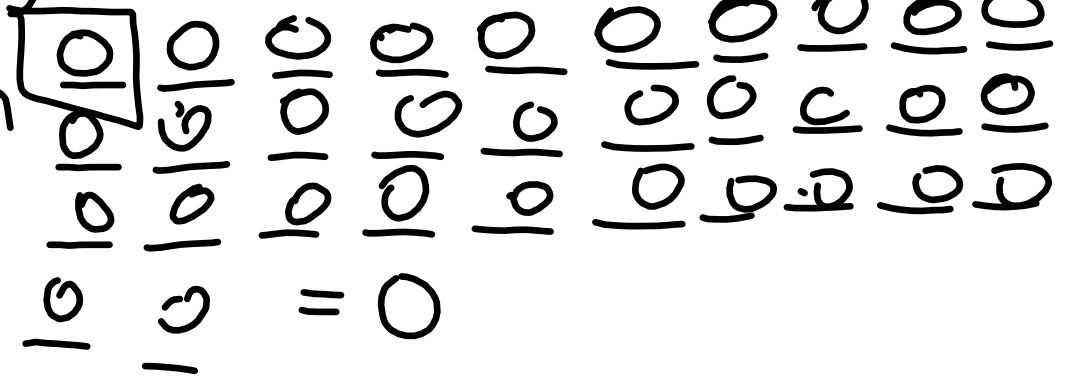
int

$-2^{31} - 2^{31}-1$ $-2,147,483,648 - 2,147,483,647$

$0 - 2^{32}-1$ • Signed

Same Range: unsigned 0 - 4,294,967,295

int = -1



Signed int

Sign

0 0 = 0

$\underline{1}\ \underline{0}\ \underline{0}\ \underline{0}\ \underline{0}$

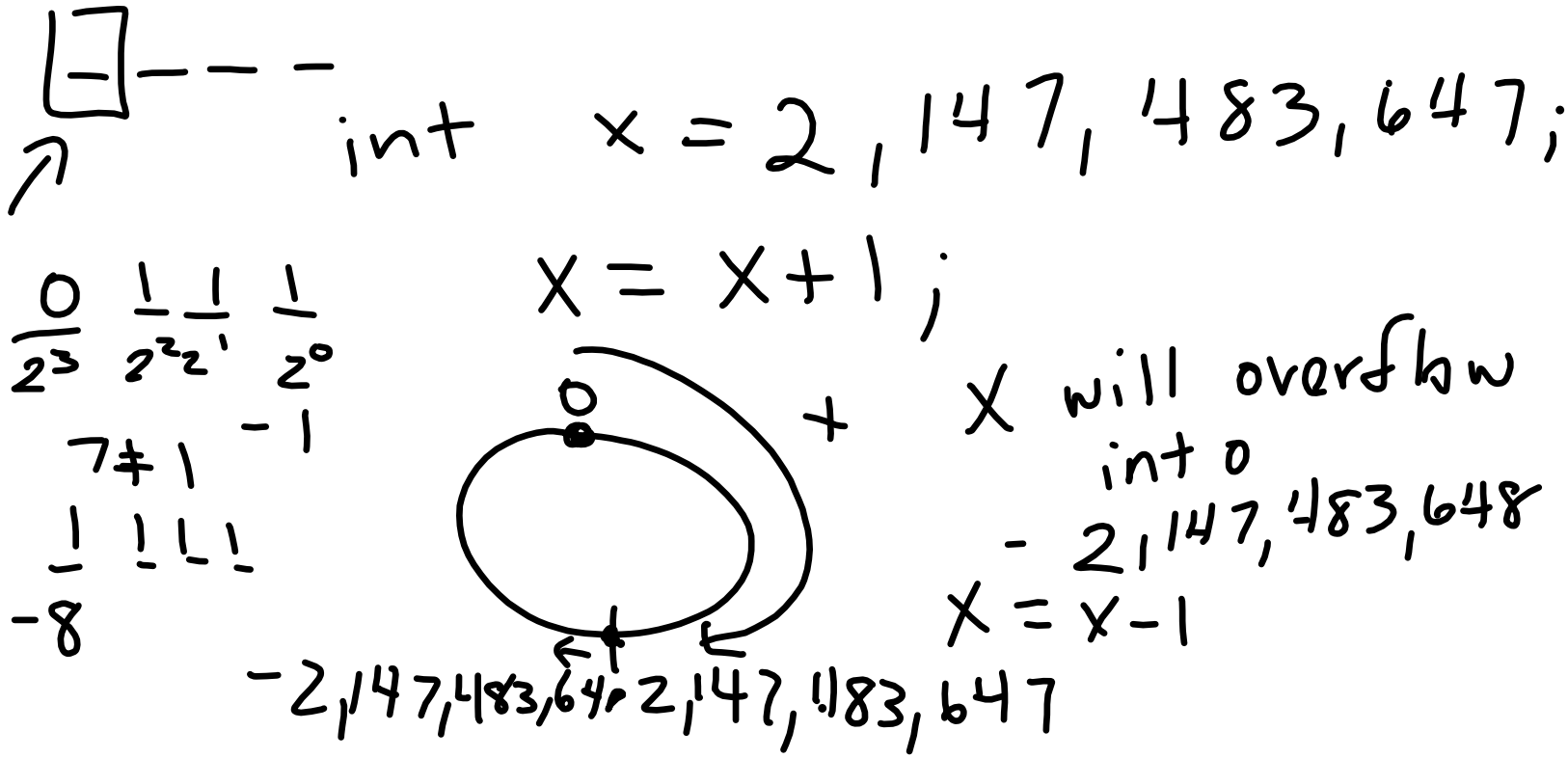
2^4 $\quad$ $\underline{a}\ \underline{b}\ \underline{c}\ \underline{d}$ $\quad$ $\underline{\quad n \quad}$

$2^3\ 2^2\ 2^1\ 2^0$ $\quad$ $2^n - 1$

$a \cdot 2^3 + b \cdot 2^2 + c \cdot 2^1 + d \cdot 2^0$

$0000 = 0$ $\quad$ $1111 = 15$

$0001 = 1$


int x = 2,147,483,647;
X = X+1;
0 1 1 1
2^3 2^2 2^1 2^0
7+1
-1
1 1 1 1
-8
0
+
X will overflow
into 0
-2,147,483,648
X = X-1
-2,147,483,64
2,147,483,647

2. char Any Symbol

0-255

'a' = 97

'A' = 65

'0' = 48

ASCII

'b' = 98

zero

'@' '!' '.' '#' '$'

3. Boolean Data Type

bool

true
false

0 - 1

bool flag = false;

Decimal Numbers

1. float - single point precision
2. double - double point precision

Void

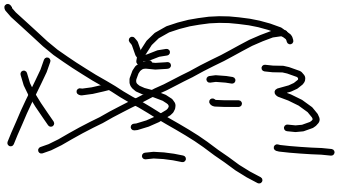
```
void main(){

 return; //optional
}
int main(){
   int x;
 return x;
} return 0;
```

1. int x; //defined w/ no value

Assign value after definition

x = _____;
left side right side



2. int x = 5;
3. int x(5);
4. int x{5};