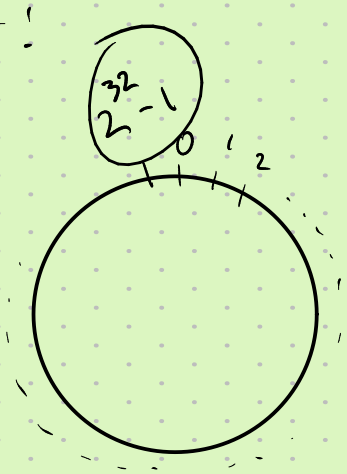
Objectives for today:

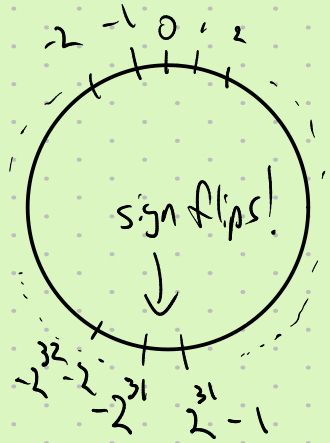
- integer representations
- boolean type & boolean expressions

Integer types in pictures:

for unsigned int:



for regular (signed) int:



base 10 base 2 (binary) $-2^{32}-2^{31}$

$5 \equiv 101 = 1\cdot 2^2 + 0\cdot 2 + 1\cdot 1^0$

$2^2\ 2^1\ 2^0$

(binary)

$2^{31}-1 = 0111\ldots1$ (31 times)

tells the sign ↘

$2^{31} = 1000\ldots0$

Treat left side of circle as $2^{32} - \langle$last 31 bits$\rangle$

(2's complement?)

Booleans

```
bool b; // b can only be true or false.
```

Note: integers count as booleans!

0 ≡ false

anything else ≡ true.

⊛ Watch out for = vs == "footgun"

Boolean Expressions

expressions that result in true/false value.

Examples:

```
x < y
x == y
x <= y
x >= y
x != y
```

Now suppose we have boolean expressions A, B

Can combine them:

A && B (true ⇔ A and B are true)

A || B (true ⇔ either A or B true)

Aside: "expressions":

```
2+3
x+y
x+3
x
int x;
while (x<10)
```

"while (x<10)"

!A (true $\Leftrightarrow$ A is false)

So, x != y $\equiv$!(x == y)