Integer Arithmetic

- Addition
- Subtraction

→ Overflow! —Solution→ Fixed Percision (truncate extra bits)

* for U $0 \leq x, y \leq 2^w - 1$

if $2^w \leq x+y < 2^{w+1}$ ~~-2~~

overflow happen, so bit w+1 would be removed, how?

$x+y \mod 2^w$

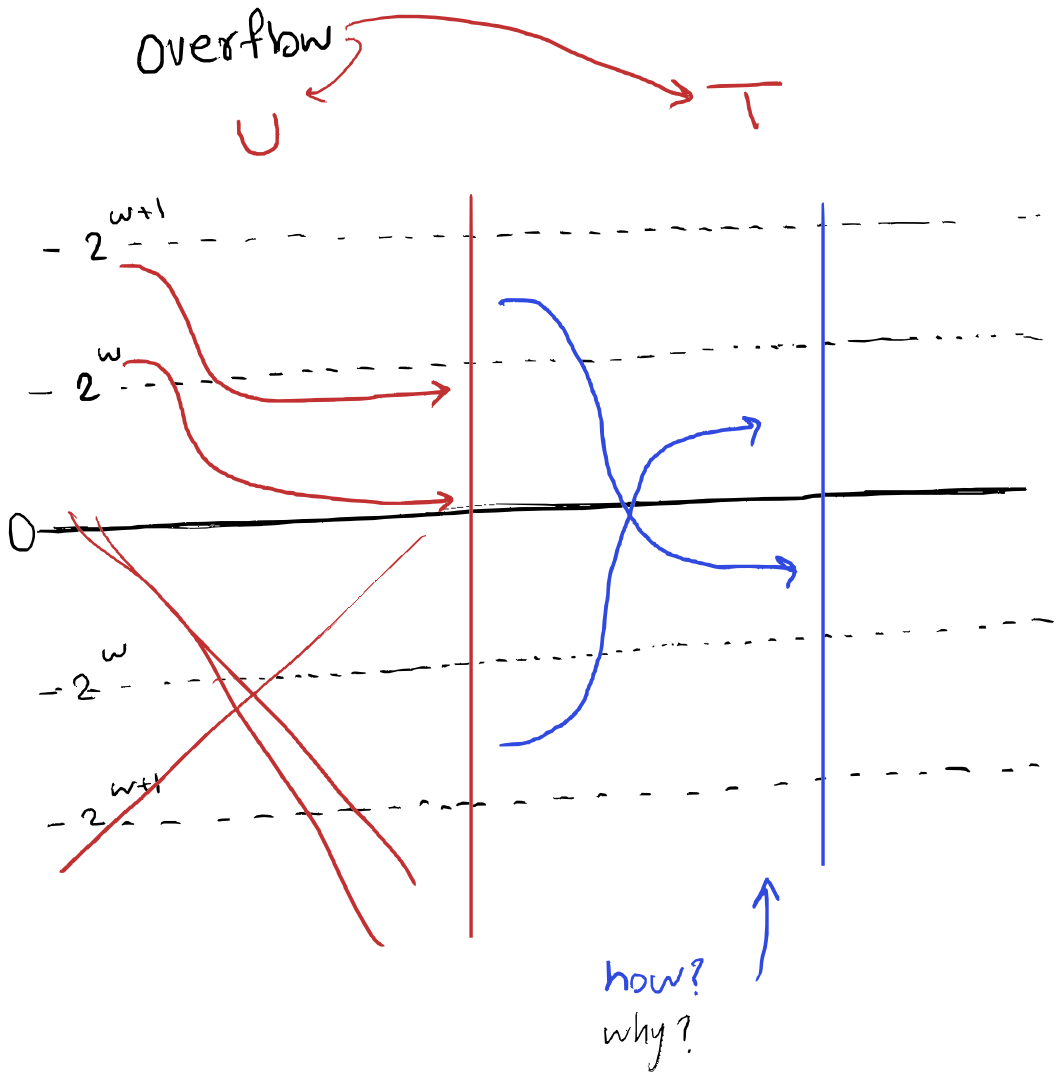
what about signed? the same!

1, add

2, drop bit w+1

3, interpret as signed number

$$x +_t^w y = U2T_w((x+y) \bmod 2^w)$$



Cost of ...

+ → 1 to 2 cycle

× → 5 to 10 cycle

÷ → 20 to 39 cycle

* $x \cdot 2^k$ just k left shift <

* $x \div 2^k$ just k logical right shift >

always floor towards 0

for ~~negative~~ signed, values

use arithmetic right shift >>

Problem: On signed value >>

round down! to solve this we add

"Bias"

How to find bias?