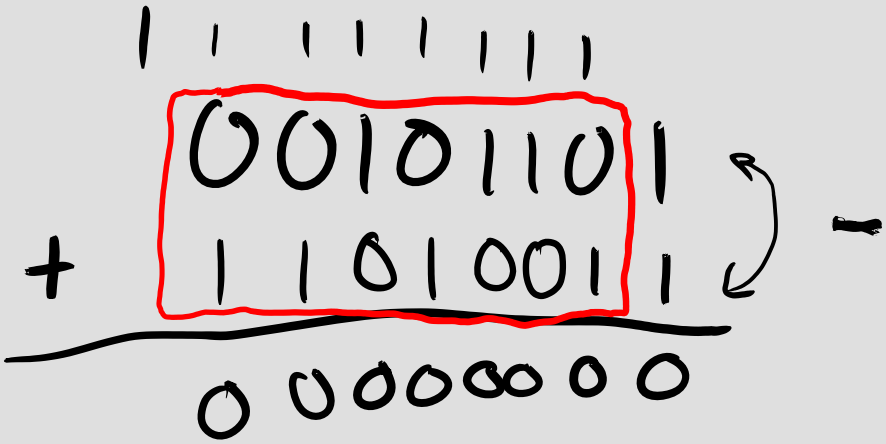
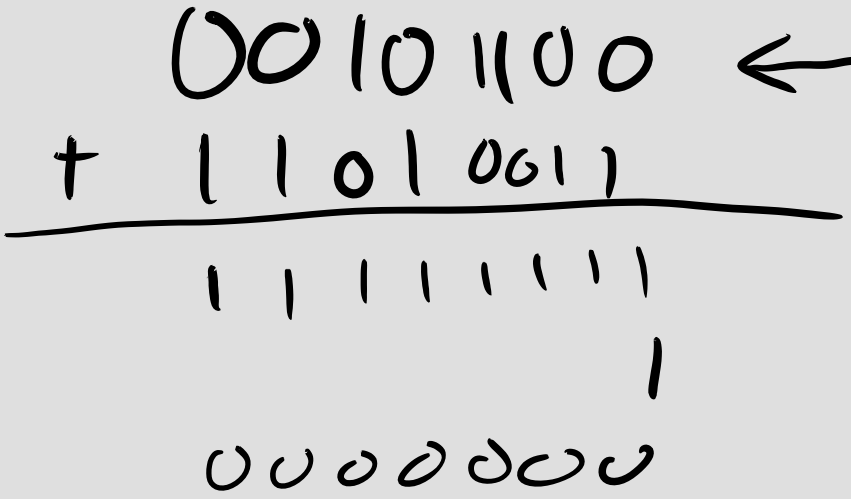
finite, fixed # of bits



$$00101100 \longleftrightarrow 11010100$$



64 32 16 8 4 2 1

11 →

-8

3 1 0 1 1

-2

1

-1

0

```
  1 1 1 1 1
  0 0 1 0 1 1
+ 0 1 1 1 1 1
-------------
  1 0 1 0 1 0
```

```
    1
  1 0 1 1 1 1
- 0 1 1 1 1 1
-------------
  0 1 0 0 0 0
```

```
  (1) 1 1 1 1 1
    0 1 0 0 0 0
-   0 1 1 1 1 1
-------------
    1 0 1 1 1 1

-   0 1 0 0 0 1
```

2's comp

01111

+ bias

01111

- bias

1001

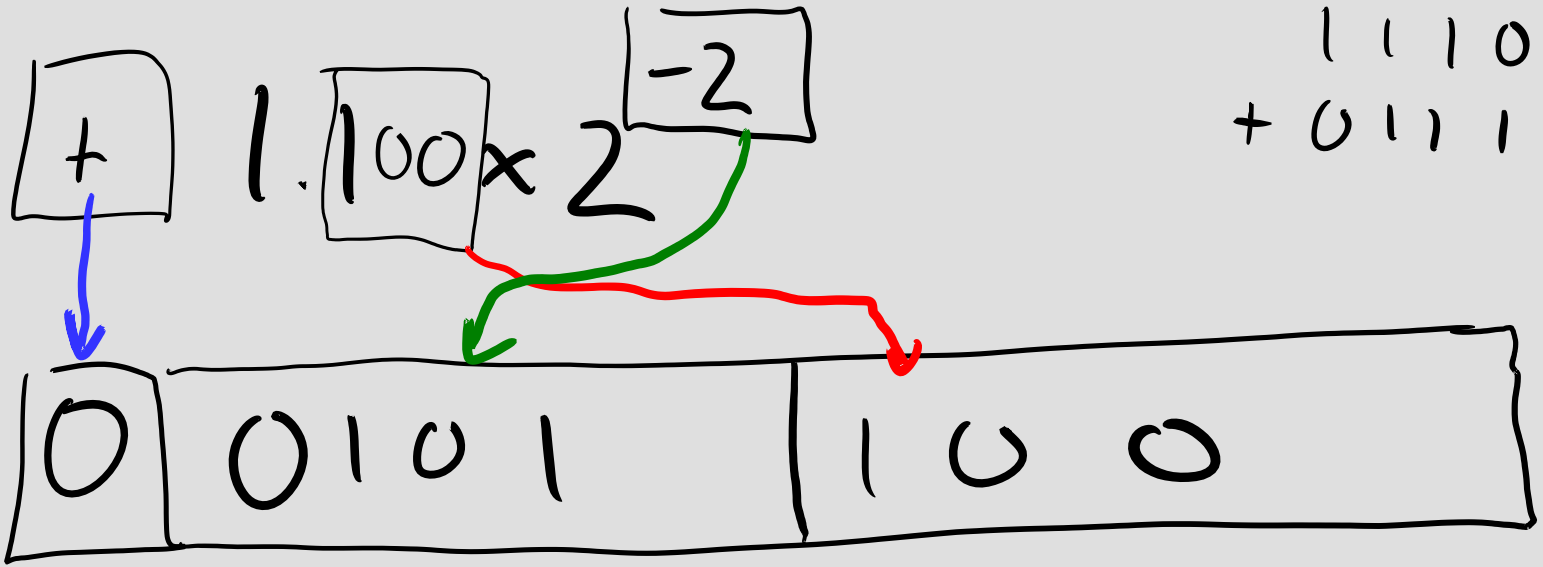
$\frac{3}{8}$ $\quad 11$ $\quad \frac{1}{8}$

2^{-1} $\quad \frac{1}{2}$ $\quad 2^{-2}$ $\quad \frac{1}{4}$ $\quad 2^{-3}$ $\quad \frac{1}{8}$

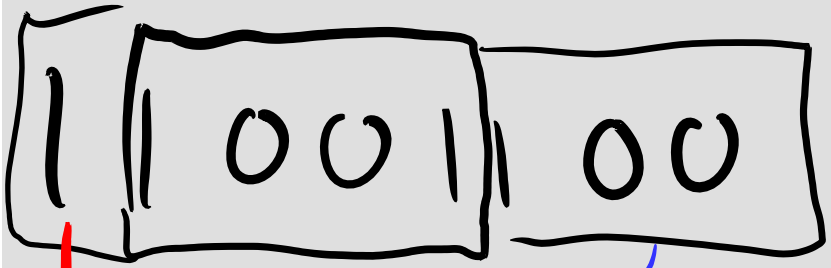
$$\begin{array}{r} {\scriptstyle 1\,1} \\ 1110 \\ +\,0111 \\ \hline 0101 \end{array}$$

$0.000 \,.\, 011000$

$$\begin{array}{r} 0010 \\ 1101 \\ 1110 \\ +\,0111 \end{array}$$



$$
\begin{array}{r}
{\scriptstyle 1\ \ 1\ \ \ \ } \\
1001 \\
-\ 0111 \\
\hline
0010
\end{array}
$$



$$-1.100 \times 2^{2}$$

-110

-6

5

00000101

bit vectors

bit-wise operators

and	&
or	|
not	~
xor	^

```
  0110
& 1100
------
  0100
```

```
  0110
^ 1100
------
  1010
```