

$$-8 + 7$$

$$\begin{array}{r} 1000 \\ 0111 \end{array}$$

$$-8 \rightarrow -6$$

$$\begin{array}{r} \dots \dots \dots -1 \\ 1000 \quad |111 \quad |110 \quad |001 \end{array}$$

$$\begin{array}{r} 0 \quad 1 \quad \dots \dots \quad 7 \\ 0000 \quad 0001 \quad |0111 \end{array}$$

$$(-5) + (-7)$$

$$\begin{array}{r} 11010 \\ + 11111 \\ \hline \cancel{111100} \\ \cancel{11000} \end{array}$$

$$5 + 6$$

$$\begin{array}{r} 00101 \\ + 0110 \\ \hline 01011 \end{array}$$

$$-7 + 5$$

$$\begin{array}{r} 1001 \\ + 0101 \\ \hline 1000010 \end{array}$$

$$+ 11$$

$$-2$$

$$\begin{array}{r} 1011 \\ + 1001 \\ \hline 1100 \end{array}$$

$$\begin{array}{r} 10011 \\ + 11001 \\ \hline 101100 \end{array}$$

BIT OVERFLOW

$$-12$$

so don't need to consider edge cases in "twos-complement.v"

⑧ two's complement

$$1000$$

$$10\underline{1}000 \quad (6 \text{ bits})$$

overflow
1111

$$110111$$

$$1000$$

$$\begin{array}{r} +1 \\ 111000 \\ \hline 110111 \end{array}$$

equivalent to

$$1000$$

$$111000$$

8

, 000

$$\min: -8 \times 4 = -32$$

reg signed [3:0] a

1 0000 0

a = 4'1010

$$\max: 7 \times 4 = 28$$

reg signed [7:0] b

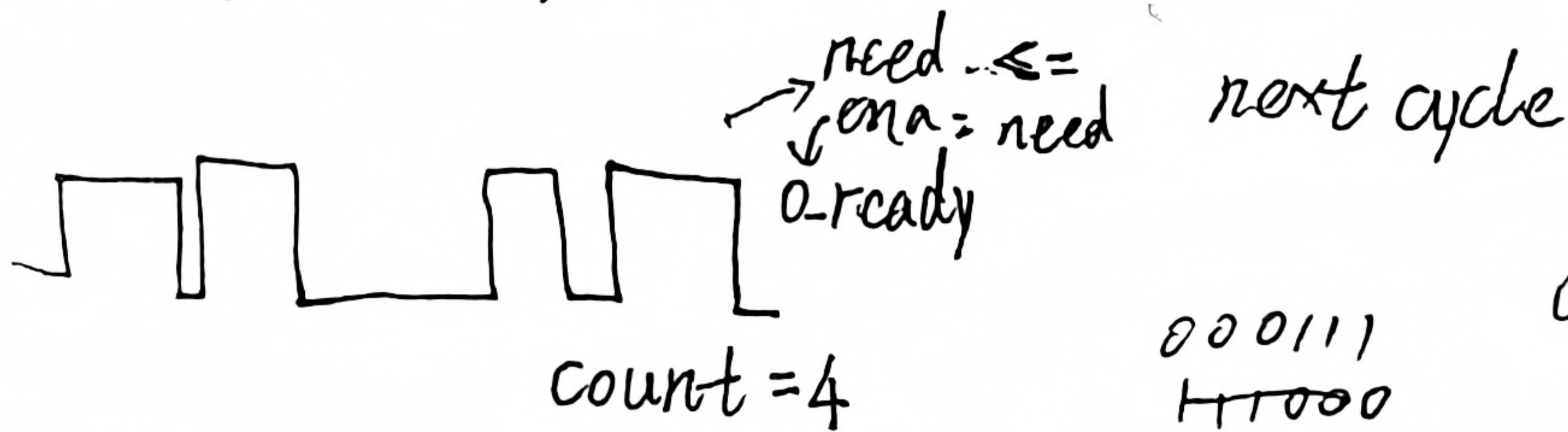
0 . . .

b = a

[6 bits]

// b = 8'1111 1010

* signed



testbench

$$1 + 4 + (-7) + (-1) \\ = \cancel{3} = -3$$

$$5 + -7 = -2$$

~~$$\begin{array}{r}
 00010 \\
 -11111 \\
 \hline
 1000100
 \end{array}$$~~

$ \begin{array}{r} 00011 \\ -11000 \\ \hline 11100 \end{array} $	$ \begin{array}{r} 00010 \\ -11100 \\ \hline 11110 \end{array} $	$ \begin{array}{r} 0001 \\ -111 \\ \hline 111 \end{array} $
---	---	--

$ \begin{array}{r} 1000 \\ -1111 \\ \hline 0111 \\ -0001 \\ \hline 1001 \\ -1110 \\ \hline 100 \end{array} $	$ \begin{array}{r} \ominus 11101 \\ \hline 100010 \end{array} $	$ \begin{array}{r} 10001 \\ -111 \\ \hline 1000 \end{array} $
---	---	--