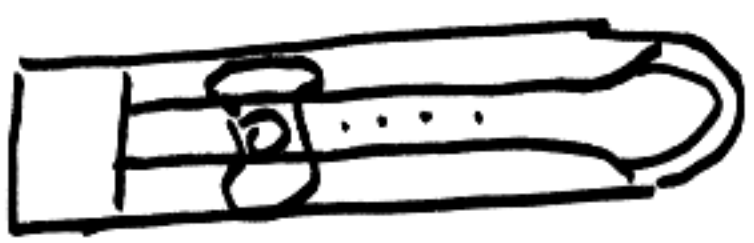
Jan 18, 2007

Reflected gray Code

Chinese Rings



slide.

Brain

Engineer Bell Labs 30's TV.

Binary Code

$0, 1, 2, \ldots, 2^n - 1$

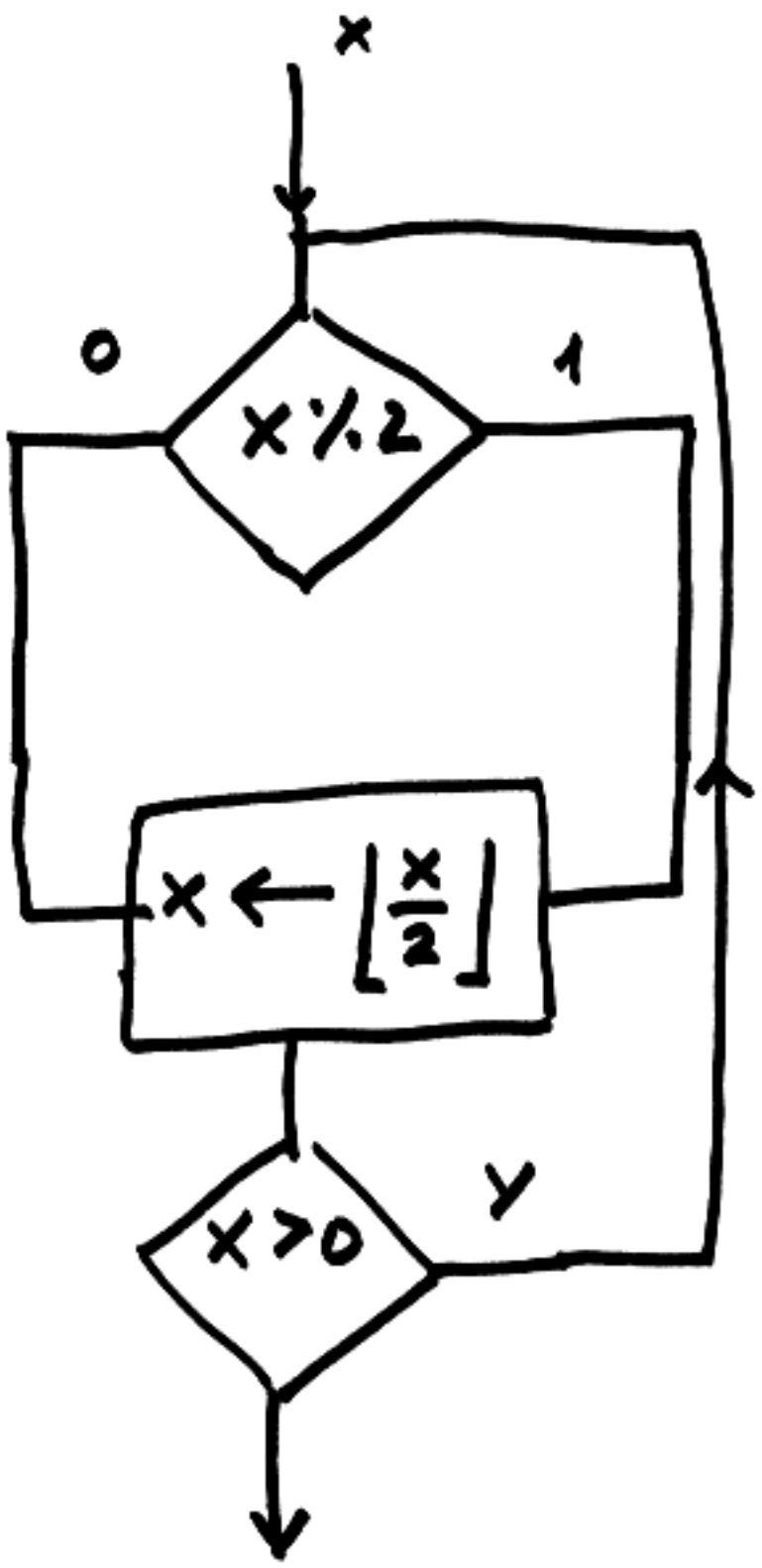
number $\rightsquigarrow$ code word
x = string of 0 and 1's.

$13 = 1101_2$

$8\ 4\ 2\ 1$

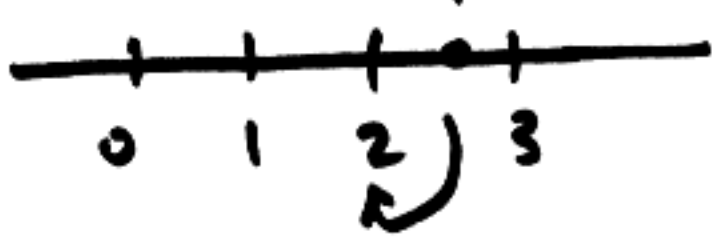
$1 + 4 + 8 = 13$

Number Theory



$13 = 1101_2$ ←

$\lfloor y \rfloor$ = largest integer smaller than or equal to y



x = 13

$13 \% 2 = \boxed{1}$

$\lfloor \frac{13}{2} \rfloor = 6$

$6 \% 2 = \boxed{0}$

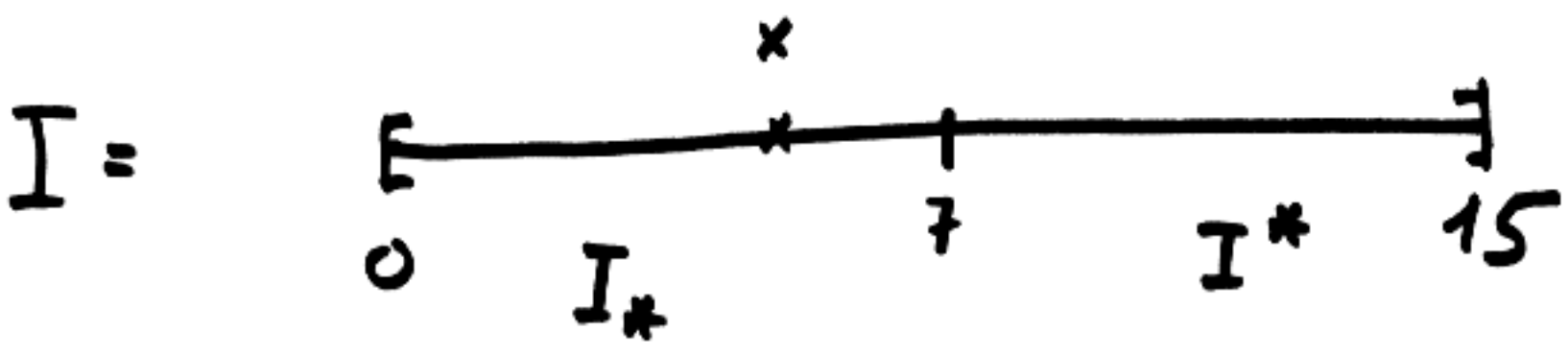
$\lfloor \frac{6}{2} \rfloor = 3$

$3 \% 2 = \boxed{1}$

$\lfloor \frac{3}{2} \rfloor = 1$

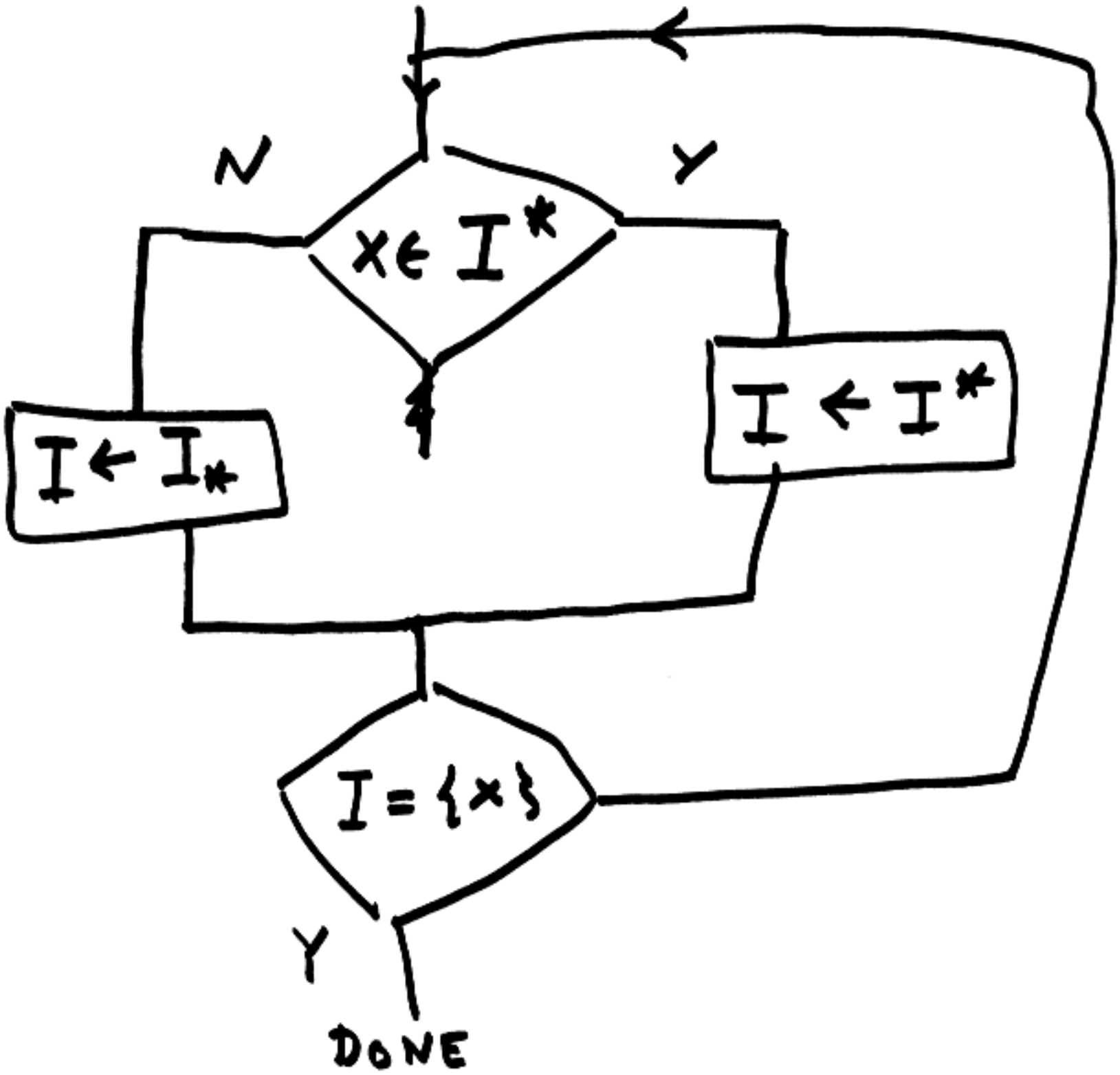
$1 \% 2 = \boxed{1}$ $\lfloor \frac{1}{2} \rfloor = 0$

Dissection, Binary search



$n = 4$ bits

$I = 0, 1, 2, \ldots, 15$



$x = 13$

I

$[0, \cdots, 15]$ $13 > 7$ 1

$[8, \ldots, 15]$ $13 > 11$ 1

8, 9, 10, 11

$[12, 13, 14, 15]$ $13 > 13$ 0

$[12, 13]$ $13 > 12$ 1

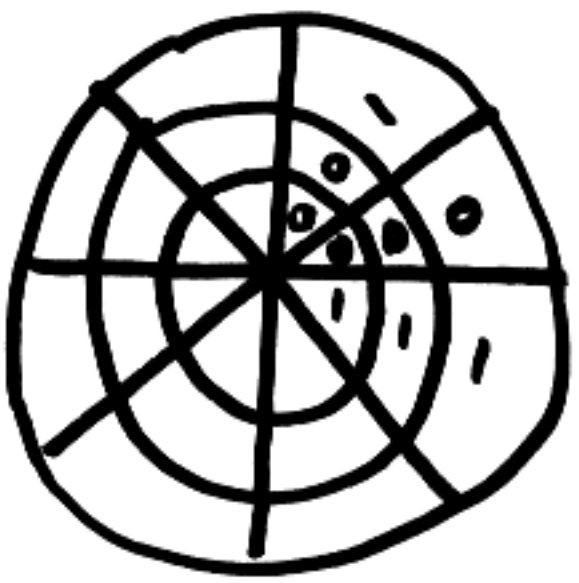
$[13]$

$13 = 1101_2$

Binary Code

	8 4 2 1	# changes
0	0 0 0 0	
1	0 0 0 1	1
2	0 0 1 0	2
3	0 0 1 1	1
4	0 1 0 0	3
5	0 1 0 1	1
6	0 1 1 0	2
7	0 1 1 1	1
8	1 0 0 0	4
9	1 0 0 1	1
10	1 0 1 0	2
11	1 0 1 1	1
12	1 1 0 0	3
13	1 1 0 1	1
14	1 1 1 0	2
15	1 1 1 1	1

Robot's arm



Binary

An error in reading will typically give a totally wrong answer.

It's better to have code words differ by at only one slot.

Binary Code

n	
1	0, 1
2	00, 01, 10, 11 (tag 0: 00, 01; tag 1: 10, 11)
3	000, 001, 010, 011, 100, 101, 110, 111