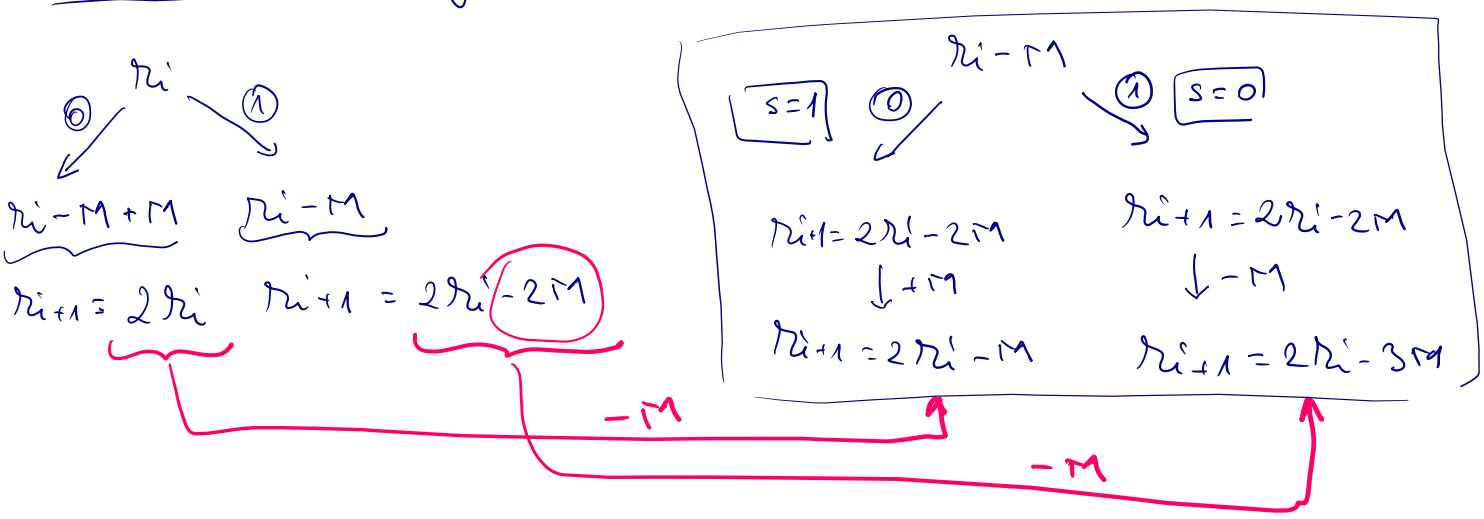
1.4.2 Non-restoring division



COUNT	S	A	Q	M
000	0	0010 1101	0001 0110	1000 0111
–	0	1000 0111		
	(1)	1010 0110	0001 011(0)	
	1	0100 1100	0010 11(00)	
001+	0	1000 0111		
	(1)	1101 0011	0010 11(00)	
	1	1010 0110	0101 1(000)	
010+	0	1000 0111		
	(0)	0010 1101	0101 1(001)	
	0	0101 1010	1011 (0010)	
011–	0	1000 0111		
	1	1101 0011	1011 (0010)	
	1	1010 0111	0110 (0100)	
100+	0	1000 0111		
	(0)	0010 1110	0110 (0101)	
	0	0101 1100	1100 1010	
101–	0	1000 0111		
	(1)	1101 0101	1100 1010	
	1	1010 1011	1001 0100	
110+	0	1000 0111		
	(0)	0011 0010	1001 0101	
	(0)	0110 0101	0010 1010	
111–	0	1000 0111		
	(1)	1101 1110	0010 1010	
cr +	0	1000 0111	42ten ← Quotient	
	0	0110 0101		

Remainder 101ten

128+
7
135

11+
128
512
1024
4096

5771 | 135
540 | 42
=371
270
101

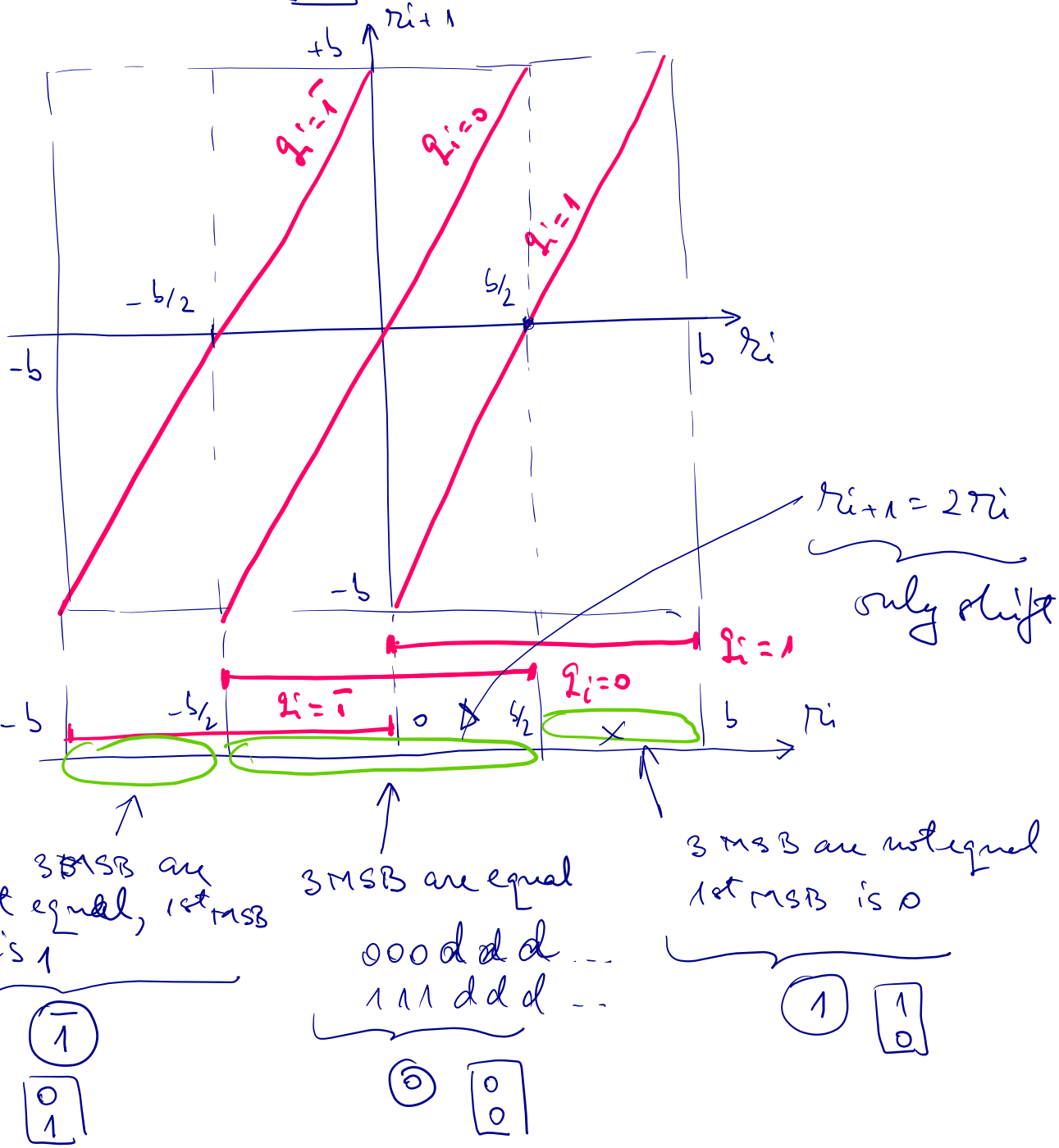
37+
64
101

1.5 Speeding up division with the SRT algorithm

Radix 2 redundant set of digits $\{\bar{1}, 0, 1\}$

Divisor(M), b if $|r_i| < b \Rightarrow |r_{i+1}| < b$

$$r_{i+1} = 2r_i - q_i \cdot b \qquad q_i \in \{\bar{1}, 0, 1\}$$



1.5.1 Radix-2 SRT example

COUNT	P (n+1 bits)	A (n bits)	B (n bit)
000	00000 0000	1110 1011	loading k=5 0's 0000 0100
	00001 1101	0110 0000	1000 0000
	$q_0=0$		shift with 0's
	0001 1010	1100 0000	
001	$q_1=0$		
	0011 0101	1000 0000	
010	$q_2=1$		
	0110 1011	0000 0001	
	− 0100 0000		
	0010 1011		
011	$q_3=1$		
	0101 0110	0000 0011	
	− 0100 0000		
	0001 0110		
100	$q_4=1$		
	0010 1100	0000 0111	
	− 0100 0000		
	0000 1100		
101	$q_5=0$		
	0001 1000	0000 1110	
	$q_6=1$		
110	0010 0000	0000 1101	
	− 0100 0000		
	0000 0000		
111	$q_7=0$		
	0000 0000	0001 1010	
conv shift	0000 0000	0001 1010	
	Remainder = 3	Quotient = 58	

$\frac{D \cdot 2^k}{d \cdot 2^k}$

43+
64
128

235 | 4
20 | 58
=35
32
=3

26+
32
58

1.5.2 Sweeney, Robertson & Tocher (SRT)