Example #1 **Non-Restoring** Division

41 / 7

41 = 00101001 (dividend)
7 = 0111 (divisor)
D = 0111
-D = 1001

0:	copy dividend shl(0)	0010 1001 0101 0010 1001
1	r = r - d ----------> r<0: shl(0)	1110 0010 1100 0100 0111
2	r = r + d ----------> r>=0: shl(1)	0011 0100 0110 1001 1001
3	r = r - d ----------> r<0: shl(0)	1111 1001 1111 0010 0111
4	r = r + d ----------> r>=0: shl(1)	0110 0010 1100 0101
done	fix: shr upper half	0110 0101 R Q

So, remainder = 6 (0110), quotient = 5 (0110)

NOTE for non-restoring division:
if you get r<0 on the last step (here the 4th step), you need to restore and shl(0) (example #2)
if you get r>=0 on the lst step (here the 4th step), do not restore, just do shl(1) (example #1)

Example #2 **Non-Restoring** Division

13 / 6

13 = 00001101 (dividend)
6 = 0110 (divisor)
D = 0110
-D = 1010

0:	copy shl(0)	0000 1101 0001 1010 1010
1	r = r - d ----------> r<0: shl(0)	1011 1010 0111 0100 0110
2	r = r + d ----------> r<0: shl(0)	1101 0100 1010 1000 0110
3	r = r + d ----------> r>=0: shl(1)	0000 1000 **0001 0001** 1010
4	r = r - d ----------> r<0: restore shl(0)	1011 0001 **0001 0001 (restored)** 0010 0010
done	fix: shr upper half	0001 0010 R Q

So, remainder = 1 (0001), quotient = 2 (0010)

NOTE non-restoring:
if you get r<0 on the last step (here the 4th step), you need to restore and shl(0) (example #2)
if you get r>=0 on the lst step (here the 4th step), do not restore, just do shl(1) (example #1)

Example #3 **Restoring** Division

13 / 6

13 = 00001101 = Dividend
6 = 0110 = Divisor
D = 0110
-D = 1010

0:	copy shl(0)	0000 1101 **0001 1010** 1010
1	r = r - d r<0: restore shl(0)	1011 1010 **0001 1010 (restored)** **0011 0100** 1010
2	r = r - d r<0: restore shl(0)	1100 0100 **0011 0100 (restored)** 0110 1000 1010
3	r = r - d r>=0: shl(1)	0000 1000 **0001 0001** 1010
4	r = r - d r<0: restore shl(0)	1011 0001 **0001 0001 (restored)** 0010 0010
done	fix: shr upper half	0001 0010