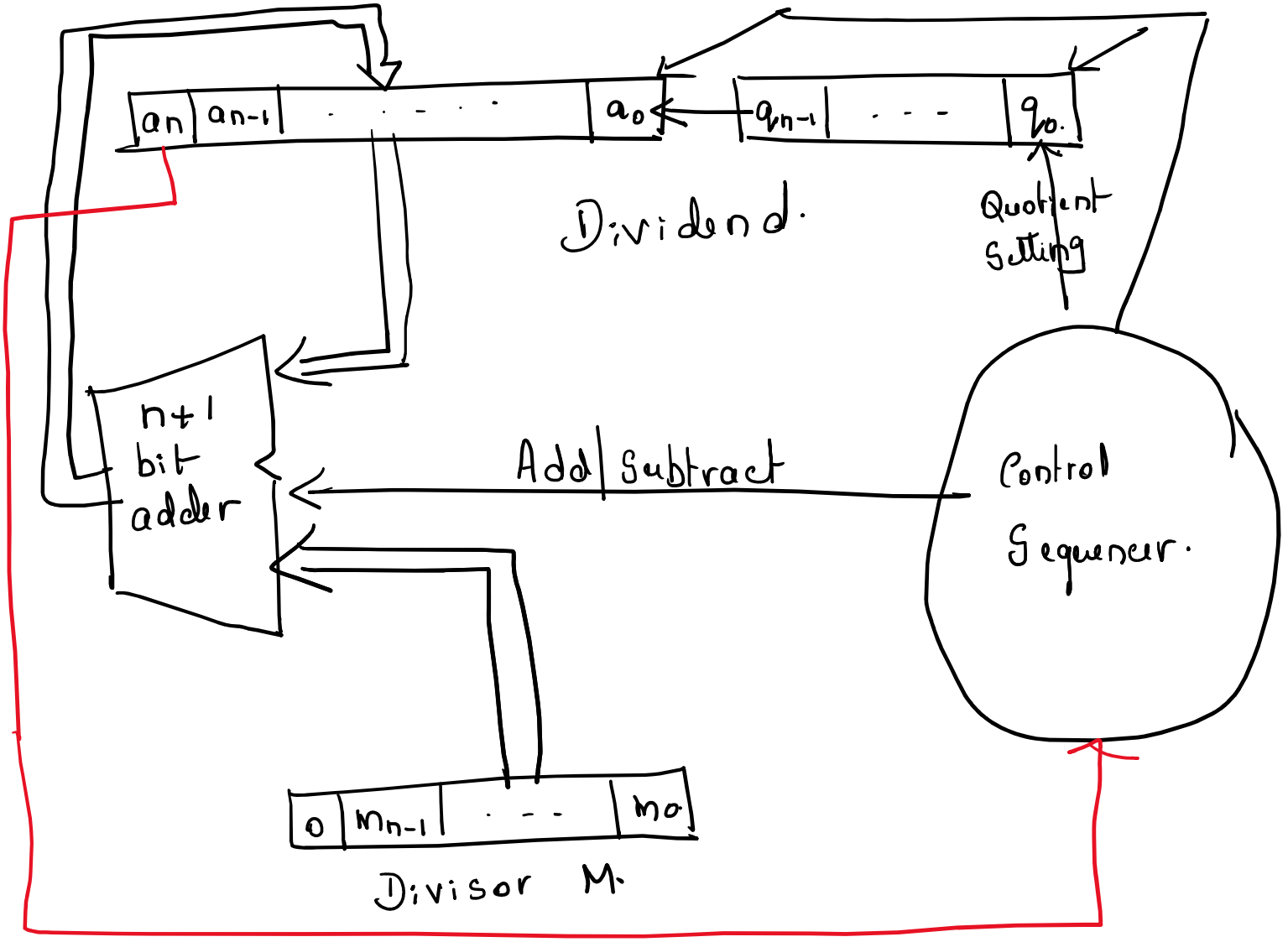
Circuit for binary division



→ Every cycle.
- Subtraction
- Addition.

Non- restoring division

Step 1: Do the following n times

1. If the sign bit of A is 0: Shift A & Q to left one bit position and Subtract M from A

Otherwise [An = 1] : Shift A and Q to left one bit position and add M to A

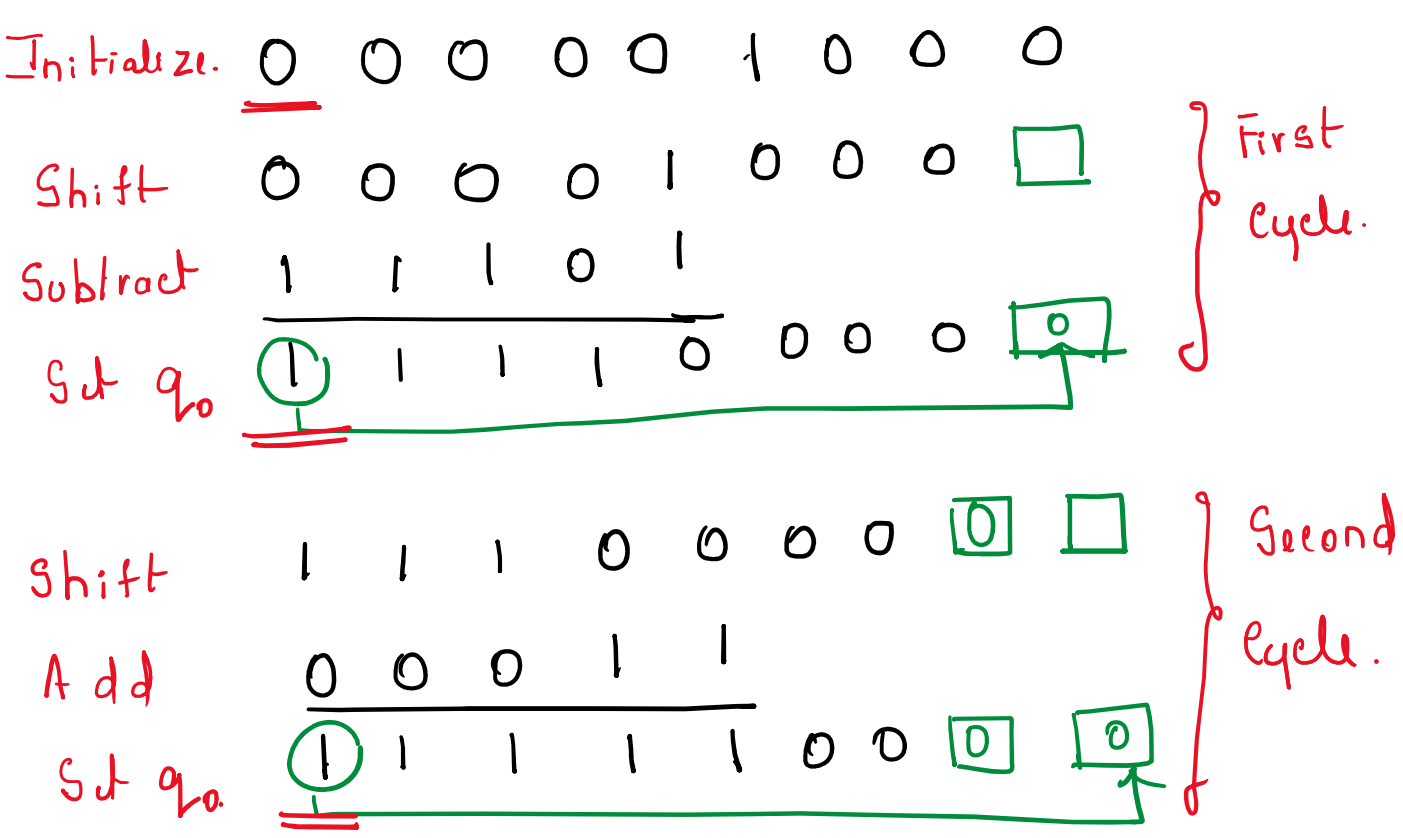
2. Now if the sign bit of A is 0, ⇒ $q_0 = 1$
otherwise set $q_0 = 0$

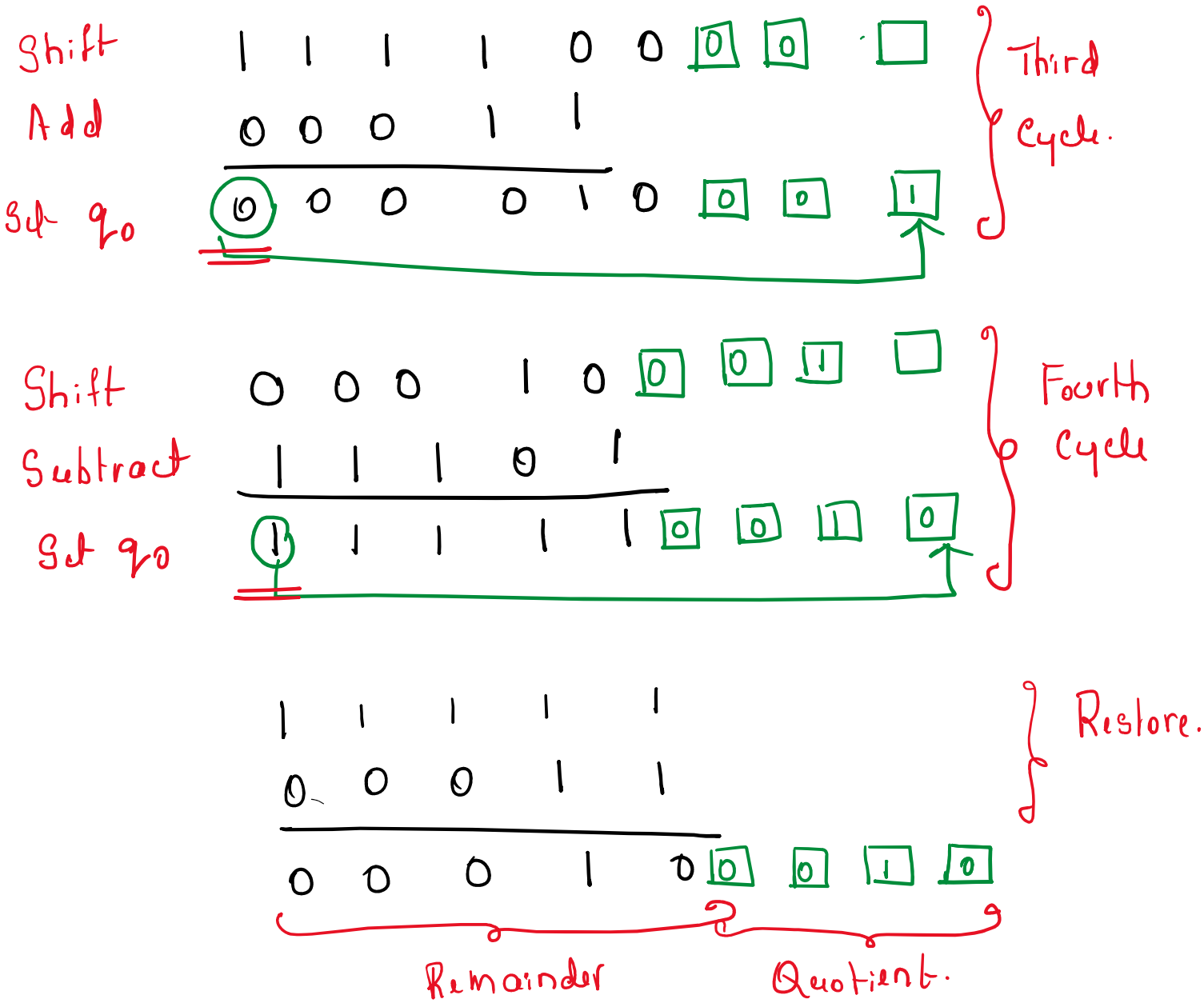
Step 2

If the sign bit of A is 1, add M to A

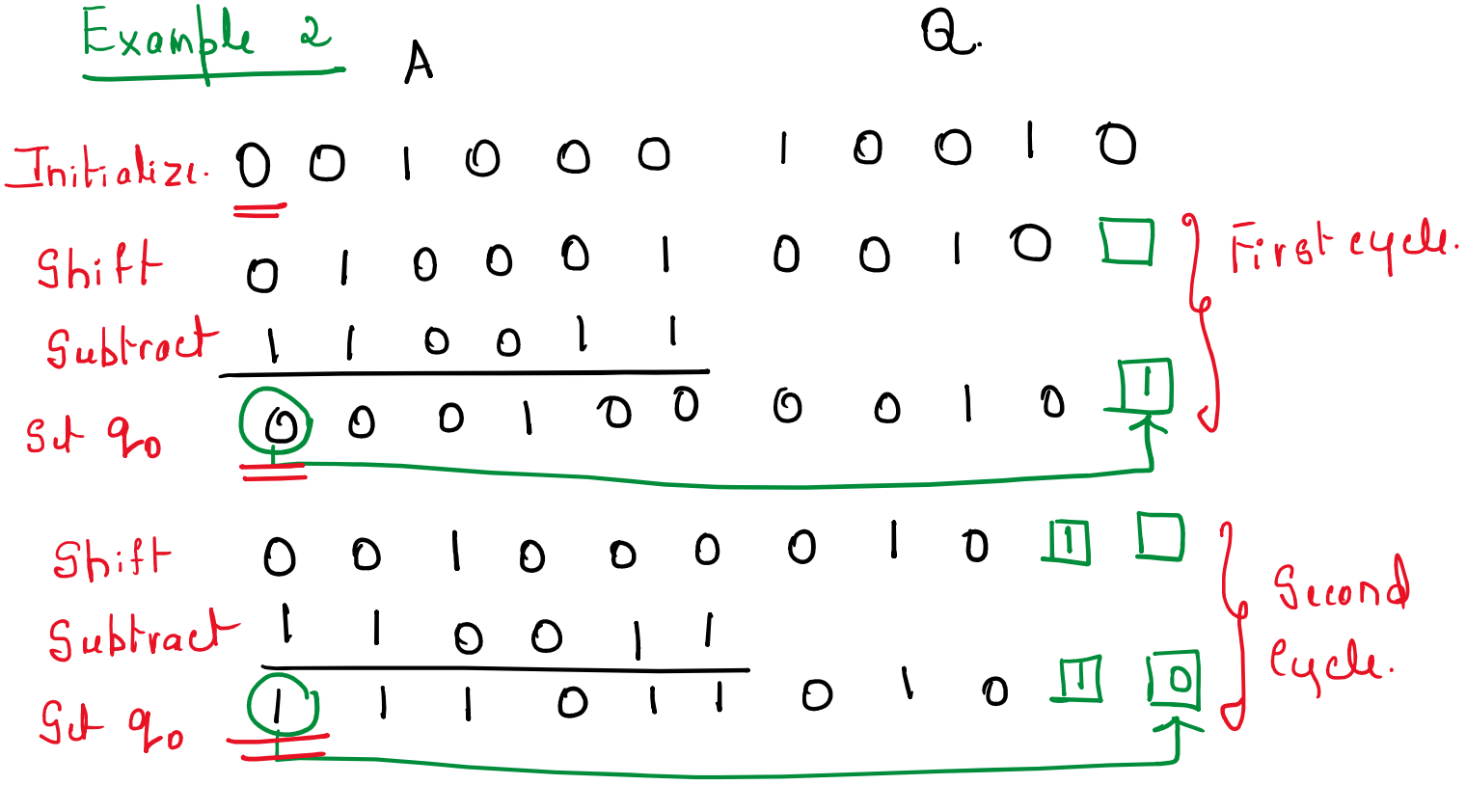
Restoring

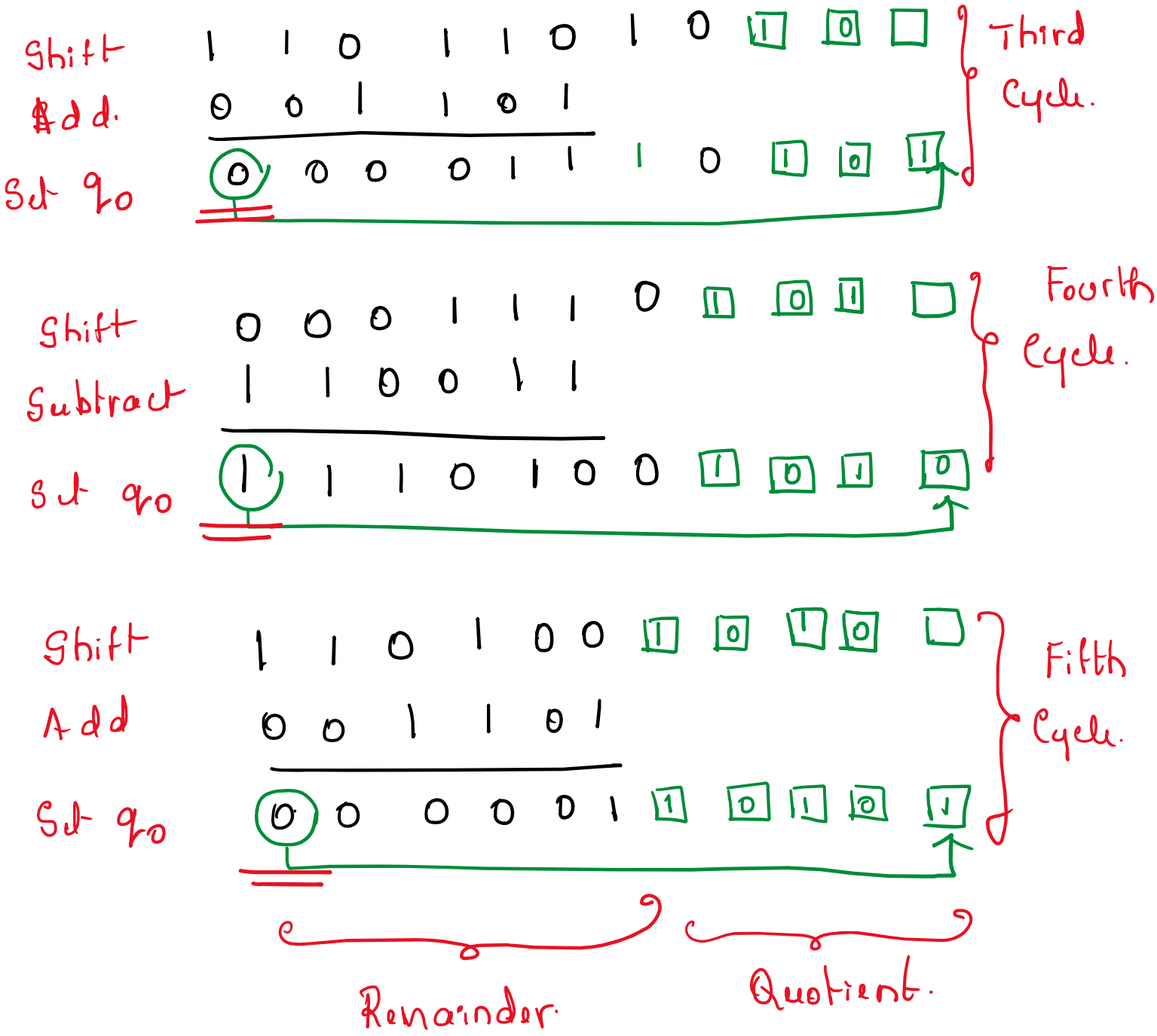
Example 1




Shift
Add
Set q0
Third cycle.
Shift
Subtract
Set q0
Fourth cycle
Restore.
Remainder
Quotient.

Example 2


A
Q.
Initialize.
Shift
Subtract
Set q0
First cycle.
Shift
Subtract
Set q0
Second cycle.



Signed number division

→ Division

→ Both dividend & divisor may be transformed to be positive numbers

— Unsigned number division

$\frac{+ve}{+ve}$ $\quad \frac{5}{2}$ $\quad Q=2$, $R=1$

$\frac{-ve}{+ve}$ $\quad \frac{-5}{2}$ $\quad Q:-2$, $R:-1$ $\quad D=-2\times2-1=-5$

$\frac{+ve}{-ve}$ $\quad \frac{5}{-2}$ $\quad Q:-2$, $R=1$ $\quad D:-2\times-2+1=5$

$\frac{-ve}{-ve}$ $\quad \frac{-5}{-2}$ $\quad Q=2$, $R=-1$ $\quad D=2\times(-2)-1=-5$

Quotient sign: Whenever Dividend and divisor are of different sign, quotient negative.

Remainder sign = Dividend sign