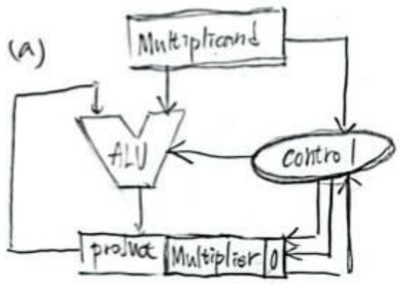
Computer Organization HW03-2 112590022

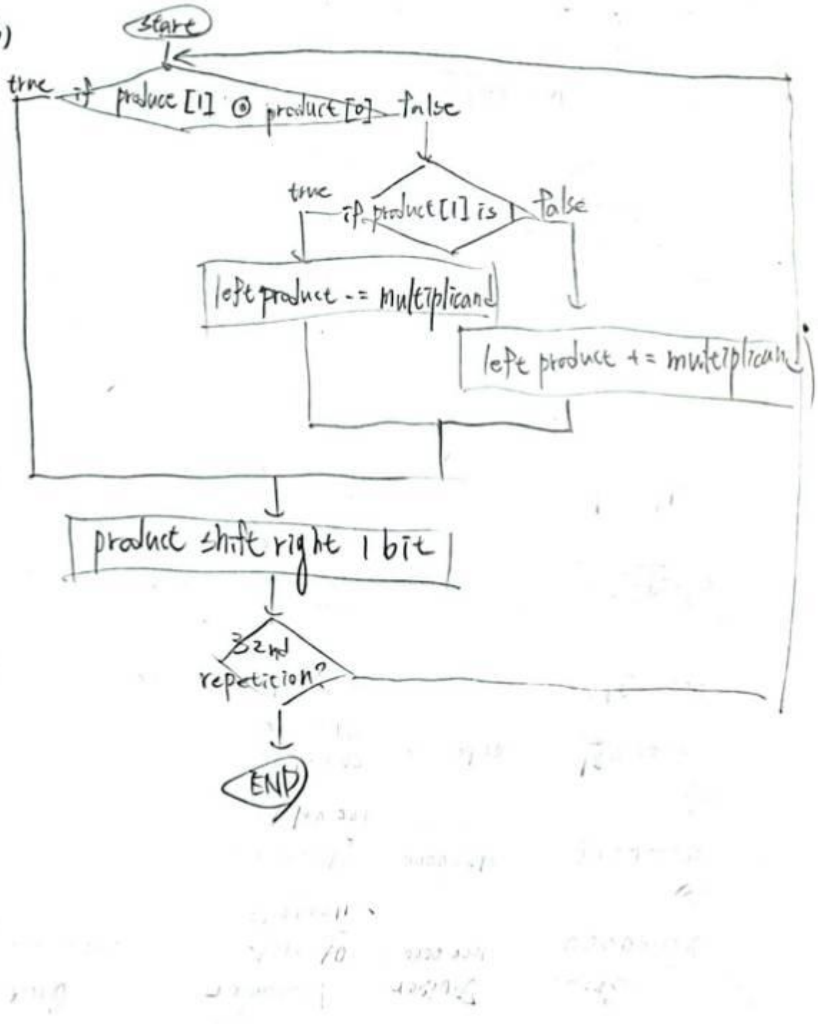
1. 147 = 10010011 28 = 00011100

Iteration	step	Remainder	Divisor
0	shift left Remainder 1 bit	00000001 00100110	00011100
1	left Remainder -= Divisor	11100101 00100110	00011100
2	if left Remainder < 0		
3	left Remainder += Divisor	00000001 00100110	
4	shift left Remainder 1 bit	00000010 01001100	
5	if not repetition 9th		
	⋮		
19	shift left Remainder 1 bit	00100100 11000000	
20	if not repetition 9th		
21	left Remainder -= Divisor	00001000 11000000	
22	if left Remainder ≥ 0		
23	shift left Remainder 1 bit and set 1	00010001 10000001	
24	if not repetition 9th		
25	left Remainder -= Divisor	11110101 10000001	
26	if left Remainder < 0		
27	left Remainder += Divisor	00010001 10000001	
28	shift left Remainder 1 bit	00100011 00000010	
29	if not repetition 9th		
30	left Remainder -= Divisor	00000111 00000010	
31	if left Remainder ≥ 0		
32	shift left Remainder 1 bit and set 1	00001110 00000101	
33	if repetition 9th		
34	left Remainder shift left 1 bit	00000111 00000101	

2. (A)



(b)



(C) in some cases, Booth's algorithm can achieve the goal with less computation than the original multiplication method.

4. (a) $0.3125 = 0.0101_{(2)} \Rightarrow 1.0101 \times 2^{0}$

$1\ 01111\ 0101000000$ #

(b) $10011000.01 + 0.0101010101$

$= 1.001100001 \times 2^{7} + 1.01010101 \times 2^{-2}$

$= 1.001100001 \times 2^{7} + 0.00000000101010101 \times 2^{7}$

$= 1.0011000100101010101 \times 2^{7}$

$0\ \underline{00111}\ 0011000100101010\underset{GRS}{\underline{10}}$ $\begin{cases} \text{Guard} = 0 \\ \text{round} = 1 \\ \text{sticky} = 0\,(0 \ldots 0) \end{cases}$ 捨去

$\Rightarrow 0\ 00111\ 001100010010101$ #

(c) $110.0111001 \times 1000.01101$

$= 1.100111001 \times 2^{2} \times 1.00001101 \times 2^{3}$

$= 110110.001011100101 \times 2^{(2+3)}$

$= 1.1011000010111001010\underline{1} \times 2^{(5+5)}$

$0\ 01010\ 1011000010111001\underset{GRS}{\underline{010}}$ $\begin{cases} \text{Guard} = 0 \\ \text{round} = 1 \\ \text{sticky} = 0\,(0 \ldots 0) \end{cases}$ 捨去

$\Rightarrow 0\ 01010\ 1011000010111001$ #

4.

(a) $0.3125 = 0.0101_{(2)} \Rightarrow 1.0101 \times 2^{0}$

1 01111 0101000000 #

(b) $10011000.01 + 0.0101010101$

$= 1.0011000001 \times 2^{7} + 1.0101010101 \times 2^{-2}$

$= 1.0011000001 \times 2^{7} + 0.000000000101010101 \times 2^{7}$

$= 1.001100000101010101 \times 2^{7}$

0 00111 001100000101010101 0 $\left\{\begin{array}{l}\text{Guard} = 1 \text{ 進位} \\ \text{round} = 0 \\ \text{sticky } 1\end{array}\right.$ (GRS)

$\Rightarrow$ 0 00111 0011000101 #

(c) $110.0111001 \times 1000.01101$

$= 1.100111001 \times 2^{2} \times 1.00001101 \times 2^{3}$

$= 110110.0010111001101 \times 2^{(2+3)}$

$= 1.10110000101110010 1 \times 2^{(5+5)}$

0 01010 1011000010111001010 $\left\{\begin{array}{l}\text{Guard} \cdot 1 \\ \text{round} = 1 \text{ 進位} \\ \text{sticky} = 1\end{array}\right.$ (GRS)

$\Rightarrow$ 0 01010 1011000110

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