

Q1a) A - B

ans: A = 001010, B = 000111, -B = 111001

$$\begin{array}{r} 001010 \\ + 111001 \\ \hline 1000011 \end{array}$$

↓
ignore

Hence A - B = (0000011)₂

b) A x B

ans: A = 001010 B = 000111
6 multiplicand 6 multiplier

Iteration	Step	Multiplier	Multiplicand(A)	product (P)
0	Initial value	000111	001010 000000 001010	000000 000000
1	P = P + A shift left A shift right B	000111 000111 000011	000000 001010 000000 010100 000000 010100	000000 001010 000000 001010 000000 001010
2	P = P + A SLA/SRB	000001	000000 101000	000000 011110
3	P = P + A SLA/SRB	000000	000001 010000	000001 000110
4	SLA/SRB	000000	000001 100000	000001 000110
5	SLA/SRB	000000	000101 000000	//
6	SLA/SRB	000000	001010 000000	//

So A x B = 000001000110 Take 2's complement:

A x B = (111110111010)₂

(c) - A/B

Ans: A = 001010

B = 000111

↳ Remainder (R)

↳ Divisor (B)

Iteration	Step	Quotient (Q)	Divisor (B)	Remainder (R)
0	initial values	00000 0	000111 000000	000000 001010
1	R = R - B Restore R Shift left Q, 0 Shift right B	000000 000000 000000 000000	000111 000000 000111 000000 000111 000000 000011 100000	111001 001010 000000 001010 000000 001010 000000 001010
2	R = R - B Restore R SRB, 0, SLQ	000000 00	000001 110000	000000 001010
3	R = R - B Restore R SRB, 0, SLQ	000000 0	000000 110000	000000 001010
4	R = R - B Restore R SRB, 0, SLQ	000000	000000 011000	000000 001010
5	R = R - B Restore R SRB, 0, SLQ	000000	000000 001100	000000 001010
6	R = R - B Restore R SRB, 0, SLQ	000000	000000 000111	000000 001010
7	R = R - B SRB, 1, SLQ	000001	000000000111	000000 000011

$$\begin{array}{r} 000000 \ 001010 \\ + 111001 \ 000000 \\ \hline 111001 \ 001010 \end{array}$$

$$\begin{array}{r} 000000 \ 001010 \\ + 111100 \ 100000 \\ \hline 111100 \ 101010 \end{array}$$

$$\begin{array}{r} 000000 \ 001010 \\ + 111110 \ 010000 \\ \hline 111110 \ 011010 \end{array}$$

$$\begin{array}{r} 000000 \ 001010 \\ + 111111 \ 001000 \\ \hline 111111 \ 010010 \end{array}$$

$$\begin{array}{r} 000000 \ 001010 \\ + 111111 \ 101000 \\ \hline 111111 \ 110010 \end{array}$$

$$\begin{array}{r} 000000 \ 001010 \\ + 111111 \ 110100 \\ \hline 111111 \ 111110 \end{array}$$

$$\begin{array}{r} 000000 \ 001010 \\ + 111111 \ 111000 \\ \hline 000000 \ 000011 \end{array}$$

A/B = 000001 remainder: 000000 000011

- A/B = 111111 remainder: 111111 111011

4) $A + B$

Ans: $A = 7.25$ $B = 3$

$$\begin{array}{r|l} 2 & 7 \\ \hline 2 & 3 \\ \hline 2 & 1 \\ \hline 2 & 0 \end{array} \begin{array}{l} \\ -1 \\ -1 \\ -1 \end{array} \Rightarrow 111$$

$$\begin{aligned} 2 \times 0.25 &= 0.50 \quad 0 \Rightarrow 01 \\ 2 \times 0.50 &= 1.00 \quad 1 \Rightarrow 01 \end{aligned}$$

$$A = (111.01)_2$$

B:

$$\begin{array}{r|l} 2 & 3 \\ \hline 2 & 1 \\ \hline 0 & \end{array} \begin{array}{l} \\ -1 \\ -1 \end{array} \Rightarrow 11 \quad B = (11)_2$$

$$A = (111.01)_2 = 1.1101 \times 2^2 = 1.1101 \times 2^{127} = 1.1101 \times 2^{129}$$

$$B = (11)_2 = 1.1 \times 2^1 = 1.1 \times 2^{127} = 1.1 \times 2^{128} = 0.11 \times 2^{129}$$

$$\begin{array}{r} 1.1101 \times 2^{129} \\ 0.1100 \times 2^{129} \\ \hline 1.01001 \times 2^{129} \Rightarrow 1.01001 \times 2^{130} \end{array}$$

$$\begin{array}{r|l} 2 & 130 \\ \hline 2 & 65 \\ \hline 2 & 32 \\ \hline 2 & 16 \\ \hline 2 & 8 \\ \hline 2 & 4 \\ \hline 2 & 2 \\ \hline 2 & 1 \\ \hline 0 & \end{array} \begin{array}{l} \\ -0 \\ -1 \\ -0 \\ -0 \\ -0 \\ -0 \\ -0 \\ -1 \end{array}$$

100000010



