Fatih Yildiz

Q3.1) We can divide the addition algorithm into 4 steps:

1- Load the inputs and check for special inputs ($-\infty, +\infty$, NaN, 0)

2- Align the mantissas (right shift the mantissa of the operand with smaller exponent until exponents match.)

3- Add or substract the mantissas.

4- Check if the result is normalized. If not, normalize.

To illustrate these steps, here is an example:

(Step 1

	exp	mantissa	
A=	00001	1011000000000	$\Rightarrow A = 3^1 \times \left(\frac{1}{3} + \frac{1}{27} + \frac{1}{81}\right) = 3^1 \times \frac{31}{81}$
B=	00010	1110000000000	$\Rightarrow B = 3^3 \times \left(\frac{1}{3} + \frac{1}{9} + \frac{1}{27}\right) = 3^3 \times \frac{13}{27}$

Step 2: Since exponents one not the same, shift A's mantissa to right by $3-1=2$ trits. We get:

(when shifting A, the rightmost 2 trits are lost)

	exp	mantissa
A=	00010	0010110000000
B=	00010	1110000000000

Step 3: Add the mantissas:

A ⇒ 0010110000000

B ⇒ 1110000000000

\+

overflow ← (1) -1-1-101100000000

Step 4: We have to normalize the result before storing it. (Note that this step is not necessary if the acquired result is already normalized.)

Rightshift by 1:

	exp	mantissa
A+B =	00011	1-1-1-1011000000

⇒ When shifting, the rightmost trit is lost.

$$\Rightarrow A+B = 3^4 \times \left(\frac{1}{3} - \frac{1}{3^2} - \frac{1}{3^3} - \frac{1}{3^4} + \frac{1}{3^6} + \frac{1}{3^7}\right)$$

In fact,

a = 1,1481481481481481

b = 13

a+b = 14,1481481481481481 which can be expressed as this.