

Subject I

James Mac-Hallam
Group 916

$$x = 167230_{(8)}$$

$$y = 22417_{(8)}$$

$$x + y = \begin{array}{r} 167230_{(8)} \\ + 22417_{(8)} \\ \hline \end{array}$$

$$s = 211647$$

$$it1: 0 + 7_{(8)} = 0 + 7 = 7$$

$$7 : 8 = 0 \quad r = 7 = 7_{(8)}$$

$$it2: 8 + 3_{(8)} + 1_{(8)} = 3 + 1 = 4$$

$$4 : 8 = 0 \quad r = 4 = 4_{(8)}$$

$$it3: 8 + 2_{(8)} + 4_{(8)} = 2 + 4 = 6$$

$$6 : 8 = 0 \quad r = 6 = 6_{(8)}$$

$$it4: 8 + 7_{(8)} + 2_{(8)} = 7 + 2 = 9$$

$$9 : 8 = 1 \quad r = 1 = 1_{(8)}$$

$$it5: 1 + 6 + 2_{(8)} = 1 + 6 + 2 = 9$$

$$9 : 8 = 1 \quad r = 1$$

$$it6: 1 + 1_{(8)} = 1 + 1 = 2$$

$$2 : 8 = 0 \quad r = 2$$

$$z = ABCD3_{(16)}$$

$$t = 9_{(16)} \quad 0 \quad 3 \quad 3 \quad 0 \quad 0$$

$$z \cdot t = ABCD3_{(16)}$$

$$A = 2ACB37C_{(16)}$$

$$it1: 0 + 3 \cdot 9_{(16)} = 0 + 3 \cdot 9 = 12$$

$$12 : 16 = 0 \quad r = 12 = C_{(16)}$$

$$it2: 0 + 1 \cdot 9_{(16)} = 0 + 1 \cdot 9 = 9$$

$$9 : 16 = 0 \quad r = 9 = 9_{(16)}$$

$$it3: 3 + 0 \cdot 9_{(16)} = 3 + 0 = 3$$

$$3 : 16 = 0 \quad r = 3 = 3_{(16)}$$

$$it4: 3 + 2 \cdot 9_{(16)} = 3 + 18 = 21$$

$$21 : 16 = 1 \quad r = 5 = 5_{(16)}$$

$$it5: 0 + 1 \cdot 9_{(16)} = 0 + 1 \cdot 9 = 9$$

$$9 : 16 = 0 \quad r = 9 = 9_{(16)}$$

$$it6: 2 + 1 \cdot 9_{(16)} = 2 + 18 = 20$$

$$20 : 16 = 1 \quad r = 4 = 4_{(16)}$$

Subject 2

James Allen-Hall

$$y = CAF, B9F_{(16)} = ? (6)$$

$$\begin{array}{r|l} CAF & 6 \\ \hline 1 & 210/6 \\ \hline 8A & 30 \\ \hline 4F & 10 \\ \hline 7 & 1 \end{array}$$

$$CAF_{16} = 23011_{(6)} (1)$$

$$\begin{array}{r} 4 \ 35 \ 0 \\ 0, B9F_{16} \\ \hline 4, 5BA \end{array}$$

$$\begin{aligned} it1: 0 + F_{16} \cdot 6_{16} &= 0 + 15 \cdot 6 = 90 \\ 90:16 &= 5 \text{ } \eta = A_{16} \\ it2: 5 + 3 \cdot 6_{16} &= 5 + 18 = 23 \\ 23:16 &= 1 \text{ } \eta = 7_{16} \\ it3: 3 + B \cdot 6_{16} &= 3 + 18 = 21 \\ 21:16 &= 1 \text{ } \eta = 5_{16} \end{aligned}$$

$$\begin{aligned} it1: 0 + A \cdot 6_{16} &= 0 + 10 \cdot 6 = 60 \\ 60:16 &= 3 \text{ } \eta = C_{16} \\ it2: 3 + B \cdot 6_{16} &= 3 + 18 = 21 \\ 21:16 &= 1 \text{ } \eta = 5_{16} \\ it3: 4 + 5 \cdot 6_{16} &= 4 + 30 = 34 \\ 34:16 &= 2 \text{ } \eta = 2_{16} \end{aligned}$$

$$\begin{aligned} it1: 0 + C_{16} \cdot 6_{16} &= 12 \cdot 6 = 72 \\ 72:16 &= 4 \text{ } \eta = 6 \\ it2: 4 + 5 \cdot 6_{16} &= 34 \\ 34:16 &= 2 \text{ } \eta = 2_{16} \\ it3: 2 + 2 \cdot 6_{16} &= 14 \\ 14:16 &= 0 \text{ } \eta = 14 = E_{16} \end{aligned}$$

$$(1), (2) = CAF, B9F_{(16)} = 23011, 420_{(6)}$$

$$\begin{aligned} it1: C_{16} &= 12 \\ 12:6 &= 2 \text{ } \eta = 0 \\ it2: A_{16} &= 10 \\ 10:6 &= 1 \text{ } \eta = 4 \\ it3: 4F &= 4 \cdot 16 + 15 = 79 \\ 79:6 &= 13 \text{ } \eta = 1 \end{aligned}$$

$$\begin{aligned} it4: 21 &= 33 \\ 33:6 &= 5 \text{ } \eta = 3 \\ it5: 3B_{16} &= 61 \\ 61:6 &= 10 \text{ } \eta = 1 \end{aligned}$$

$$\begin{aligned} it6: 5A &= 5 \cdot 16 + 10 = 90 \\ 90:6 &= 15 \text{ } \eta = 0 \end{aligned}$$

$$\begin{aligned} it6: F_{16} &= 15 \\ 15:6 &= 2 \text{ } \eta = 3 \end{aligned}$$

$$\begin{array}{r} 0, B9F \cdot 6 = 4, 5BA \\ 0, 5BA \cdot 6 = 2, 25C \\ 0, 25C \cdot 6 = 0, E26 \\ \hline 0, B9F_{16} = 0, 420_{(6)} (2) \end{array}$$

II. Theory part.

$$(16 > 6)$$

Group 314. James Van-Nation

Since the ~~source~~ source base is greater than the destination base, we use the method of successive divisions/multiplication.

Calculations are performed in the source base. For the integer part the method of successive divisions by the destination base (here 6) is applied. For the fractional part we apply successive multiplication, once again by the destination base (6).

$(x=12345, 12)$
 $x = 12345 = 8,192 + 4096 + 32 + 16 + 8 + 1 = 2^{13} + 2^{12} + 2^5 + 2^4 + 2^3 + 2^0 =$
 $= 11000000111001_2$

$x = 11000000111001, 000111101011_2 =$

$= 1,1000000111001,000111101011_2 \cdot 2^{13} \Rightarrow e=13$
 (w/ hidden not represented)

$0,12 \cdot 8 = 0,96$
 $0,96 \cdot 8 = 7,68$
 $0,68 \cdot 8 = 5,44$
 $0,44 \cdot 8 = 3,52$

$c = e + q = 13 + 12 = 25$
 $= 2^7 + 2^3 + 2^0$
 $= 10001011_2$
 10001100_2

$0,12 = 0,125_8 = 000111101011_2$
 4 6 4 0 E 8 7 A

$0100011001000000111001000111101011 =$
 s c m

$= 45C0ERFG$
 $4640E87A$
 (16)
 (16)

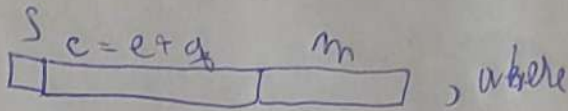
Subject III, option 4, James A'kon-Hariton,
 Group 9/4

Theory part for subject III:

Group 314

Adnan Akas-Mustafa

For floating point representation the memory location is the following?



S - is the sign bit

c = exponent + bias

q - constant

e - exponent from the binary representation with mantissa and exponent

m: mantissa ----- n -----

For example:

$$1101,0011_{(2)} = 0,11010011_{(2)} \cdot 2^4$$

mantissa
base
exponent

here it is smaller than 1

$$m < 1$$

$$\text{but it can be } 1 < m < 2$$

With single precision we have: m = 32 bits, c on 8 bit, m on 23 bits, q = 127

Firstly we convert our number into ~~decimal~~ binary, but initially only the integer part. Then we write the number with exponent and a ~~max~~ $1 < \text{mantissa} < 2$. The 1 is a hidden bit, not represented internally. This integer part ~~part~~ is put into the mantissa part in the memory.

Furthermore with successive $\times 2$ multiplication we obtain the fractional part and we fill the remaining empty bits with them from left to right until we reach the last bit on the mantissa part.

Then we calculate e , its binary representation is put in its position (on those bits). Lastly we also modify the sign bit ~~if needed~~ corresponding to our number (here it is zero since we have a positive number).

James Peter Norton