Assignment 2 (week 0)

6) Binary addition

a) 40 + 31

2	40
2	20 0
2	10 0
2	5 0
2	2 1
	1 0

2	31
2	15 1
2	7 1
2	3 1
	1 1

$(101000)_2$ $(11111)_2$

1 0 1 0 0 0 - 40

0 1 1 1 1 1 - 31

1 0 0 0 1 1 1 - 71

b) 1100 0011 + 0101 1110

1100 0011 - 195

0101 1110 - 94

100 100001 - 289

7 Binary subtraction

a) 17-11

2	17
2	8 1
2	4 0
2	2 0
	1 0

$(10001)_2$

2	11
2	5 1
2	2 1
	1 0

$(1011)_2$

10101 - 17

1011 - 11

0110 - 6

b, 11010001 - 01000111

1101 0001 - 209

0100 0111 - 71

1000 1010 - 138

8, Binary multiplication

9, 20 x 5

2	20
2	10 0
2	5 0
2	2 1
	1 0

2	5
2	2 1
	1 0

101

$(10100)_2$ $(101)_2$

10100 - 20

101 - 5

10100

00000x

10100xx

1100100 - 100

Q) Binary Division

a) 121/14

2	121
2	60 1
2	30 0
2	15 0
2	7 1
2	3 1
	1 1

$(1111001)_2$

2	14
2	7 0
2	3 1
	1 1

$(1110)_2$

16	8	4	2	1
	1	1	1	1
1	0	0	1	0

$$
\begin{array}{r}
1000 \\
1110\overline{)1111001} \\
1110 \\
\hline
0001001 \\
0000 \\
\hline
1001
\end{array}
$$

121/14 = Quotient $-(1000)_2 = 8$

Remainder $-(1001)_2 = 9$

b)

$$
\begin{array}{r}
11000 \\
111\overline{)1010\ 1010} \\
0111 \\
\hline
111 \\
111 \\
\hline
0010 \\
000 \\
\hline
10
\end{array}
$$

(170/7)

16	8	4	2	1
	1	0	1	0

170/7 = Quotient $= (11000)_2 = 24$

Remainder $= (10)_2 = 2$

10) floating Number to binary

a) $(34.34)_{10} = (?)_2$

2	34
2	17 0
2	8 1
2	4 0
2	2 0
	1 0

$0.34 \times 2 = 0.68$ 0

$0.68 \times 2 = 1.32$ 1

$0.36 \times 2 = 0.72$ 0

$0.72 \times 2 = 1.44$ 1

$(0.34)_{10} = (0.0101)_2$

$(34)_{10} = (100010)_2$

$(34.34)_{10} = (100010.0101)_2$

b) $(10.16)_{10}$ to hexadecimal

$(10)_{10} = (A)_{16}$

$0.16 \times 16 = 2.56$ 2

$0.56 \times 16 = 8.96$ 8

$0.96 \times 16 = 15.36$ F

$0.36 \times 16 = 5.76$ 5

$(0.16)_{10} = (28F5)_{16}$

$(10.16)_{10} = (A.28F5)_{16}$

12) "CODE/THS 2022" in 8 bits

Ans,

01000111 01001111 01000100 01000101

00101111 01010100 01001000 01010011

00100000 00110010 00110000

00110010 00110010

13, $(ABC7)_{16}$ to Binary

A B C 7

$(1010\ 1011\ 1100\ 0111)_2$

14) $(0.1001)_2 = (?)_{10}$

0. 1 0 0 1

$2^{-1}\ 2^{-2}\ 2^{-3}\ 2^{-4}$

$0.\left(\frac{1}{2}\times1\right)+\left(\frac{1}{4}\times0\right)+\left(\frac{1}{8}\times0\right)+\left(\frac{1}{16}\times1\right)$

$0.\frac{1}{2}+\frac{1}{16}$

0.5625

$(0.1001)_2 = (0.5625)_{10}$

b, $(1.1111)_2 = (?)_{10}$

~~$(x)_2 = (y)_2$~~

$$1.1\quad 1\quad 1\quad 1$$
$$(1\times 2^0).(1\times 2^{-1})+(1\times 2^{-2})+(1\times 2^{-3})+(1\times 2^{-4})$$
$$1.\frac{1}{2}+\frac{1}{4}+\frac{1}{8}+\frac{1}{16}$$
$$(1.9375)_{10}$$

15, binary expansion of

a) $11/7 = 0.647$

0.647×2	$= 1.294$	1
0.294×2	$= 0.588$	0
0.588×2	$= 1.176$	1
0.176×2	$= 0.352$	0

$(11/7)_{10} = (0.1010)_2$

b) $3/11 = $ ~~0.647~~ 0.2727

0.2727×2	$= 0.5454$	0
0.5454×2	$= 1.0908$	1
0.0908×2	$= 0.1816$	0
0.1816×2	$= 0.3632$	0

$(3/11)_{10} = (0.0100)_2$

Bonus Question 2 (WD)

Q, Decode 4D 41 54 48 40 66

75 6E

4D 41 54 48 40 .... 66 75 6E

M A T H @ f u n

MATH@fun