Q 1.1

Decimal 256

Binary ~~0-255~~ ~~2)255~~ = (11111111)

256 - 2^7 = ~~128~~ 128 (1)

128 - 2^6 = 64 (1)

64 - 2^5 = 32 (1)

32 - 2^4 = 16 (1)

16 - 2^3 = 8 (1)

8 - 2^2 = 4 (1)

4 - 2^1 = 2 (1)

2 - 2^0 = 1 (1)

Octal 8)256 = ~~032~~ = 400

32 % 0

8)32 = 4 % 0

8)4 = 0 % 4

Hex 16)256 = 16 % 0 = 100

16)16 = 1 % 0

16)1 = 0 % 1

Base-7 7)256 = 36 % 4 = 514

7)36 = 5 % 1

~~7)1 = 0 % 1~~

7)5 = 0 % 5

Binary 10101010

Decimal

~~$1\times2^0 + 0\times2^1 + 1\times2^2 + 0\times2^3 + \ldots$~~

~~$1\times2^4 + 0\times2^5 + 1\times2^6$~~

$1\times2^7 + 0\times2^6 + 1\times2^5 + 0\times2^4 + 1\times2^3 + 0\times2^2 + 1\times2^1$

$+ 0\times2^0 = 170$

Octal 8)170 = 21 % 2 = 252

8)21 = ~~0~~ 2 % 5

8)2 = 0 % 2

Hex 16)170 = 10 % 10(A) = AA

16)10 = 0 % 10(A)

Base-7 7)170 = 24 % 2 = 332

7)24 = 3 % 3

7)3 = 0 % 3

Octal 237

Decimal $2\times8^2 + 3\times8 + 7$

= 128 + 24 + 7

= ~~159~~ 159

Binary 2)159 = 79 % 1 (~~1111001~~) (10011111)

2)79 = 39 % 1

2)39 = 19 % 1

2)19 = 9 % 1

2)9 = 4 % 1

2)4 = 2 % 0

2)2 = 1 % 0

2)1 = 0 % 1

Hex 16)159 = 9 % ~~B~~ 15(F) = 9F

16)9 = 0 % 9

Base-7 7)159 = 22 % 5 ~~345~~ 315

7)22 = 3 % 1

7)3 = 0 % 3

Hex 81

Decimal $16 \times 8 + 1$

$= 129$

Binary: $2\overline{)129} = 64 \text{ r } 1 = (1000\,0001)_{//}$

$2\overline{)64} = 32 \text{ r } 0$

$2\overline{)32} = 16 \text{ r } 0$

$2\overline{)16} = 8 \text{ r } 0$

$2\overline{)8} = 4 \text{ r } 0$

$2\overline{)4} = 2 \text{ r } 0$

$2\overline{)2} = 1 \text{ r } 0$

$2\overline{)1} = 0 \text{ r } 1$

Base Octal $8\overline{)129} = 16 \text{ r } 1 = 201_{//}$

$8\overline{)16} = 2 \text{ r } 0$

$8\overline{)2} = 0 \text{ r } 2$

Base-7 $7\overline{)129}$ $18 \text{ r } 3 = 243_{//}$

$7\overline{)18} = 2 \text{ r } 4$

$7\overline{)2} = 0 \text{ r } 2$

Base 7 42

Decimal $(4 \times 7) + 2 = 30_{//}$

Binary: $2\overline{)30} = 15 \text{ r } 0$ $(0001\,1110)_{//}$

$2\overline{)15} = 7 \text{ r } 1$

$2\overline{)7} = 3 \text{ r } 1$

$2\overline{)3} = 1 \text{ r } 1$

$2\overline{)1} = 0 \text{ r } 1$

Octal: $8\overline{)30} = 3 \text{ r } 6 = 36_{//}$

$8\overline{)3} = 0 \text{ r } 3$

Hex $16\overline{)30} = 1 \text{ r } 14$ (E) $1E_{//}$

$16\overline{)1} = 0 \text{ r } 1$

1.2

1.2.1 1010.10101010

$0 \times 2^{0} + 1 \times 2^{1} + 0 \times 2^{2} + 1 \times 2^{3}$

$= 0 + 2 + 0 + 8 = 10$

$0 \times 2^{-1} + 1 \times 2^{-2} + 0 \times 2^{-3} + 1 \times 2^{-4}$

$+ 0 \times 2^{-5} + 1 \times 2^{-6} + 0 \times 2^{-7} + 1 \times 2^{-8}$

$= 0 + 0.5 + 0 + 0.125 + 0 + 0.03125 + 0 + 0.0078125$

$= 0.6640625$

$1010.10101010 = 10.6640625_{//}$

1.2.2

1111 0011 . 1100 1111

$128 + 64 + 32 + 16 + 2 + 1$

$= 243_{//}$

$0.5 + 0.25 + 0 + 0 + 0.03125 + 0.015625 + 0.0078125$

$+ 0.00390625$

$= 0.80859375_{//}$

243.80859375

a1.3

1.3.1

100↓ 50↓ -50↓

01100100 00110010 11001101 +1
11001110

100-50
01100100
+11001110
1 00110010 = 50

100↓
1100100

2|100 = 50 r0
2|50 = 25 r0
2|25 = 12 r1
2|12 = 6 r0
2|6 = 3 r0
2|3 = 1 r1
2|1 = 0 r1

2|50 = 25 r0
2|25 = 12 r1
2|12 = 6 r0
2|6 = 3 r0
2|3 = 1 r1
2|1 = 0 r1

50↓
110010

1.3.2

20↓ 60↓ -60↓

00010100 00111100 11000011 +1
11000100

20-60
00010100
+11000100
1 11011000 2's -40
XOR 00100111
+ 1
00101000 = 40
Regular Binary

2|20 = 10 r0
2|10 = 5 r0
2|5 = 2 r1
2|2 = 1 r0
2|1 = 0 r1

20↓
10100

2|60 = 30 r0
2|30 = 15 r0
2|15 = 7 r1
2|7 = 3 r1
2|3 = 1 r1
2|1 = 0 r1

60↓
111100