Jesse Mayer

HW#1

1.a. Between 1111 and 0000.

b. Between 1000 and 0111.

2.a. (2^11 + 2^10 + 2^7 + 2^4 + 2^2 + 2^0)/2^4 = 3221/16 = 201.3125

b. (-2^11 + 2^10 + 2^7 + 2^4 + 2^2 + 2^0)/2^4 = -875/16 = -54.6875

3.a. -2^5 + 2^3 + 2^2 + 2^0 = -19

b. B=>1011 E=>1110 E=>1110 F=>1111

-2^15 + 2^13 + 2^12 + 2^11 + 2^10 + 2^9 + 2^7 + 2^6 + 2^5 + 2^3 + 2^2 + 2^1 + 2^0 = -16657

4.a. N	Quotient	Remainder	Result
150	75	0	0
75	37	1	10
37	18	1	110
18	9	0	0110
9	4	1	10110
4	2	0	010110
2	1	0	0010110
1	0	1	10010110

b. N	Quotient	Remainder	Result
1500	93	12	C
93	5	13	DC
5	0	5	5DC

5.a. N	Prod	Whole	Fraction	Result
.9	1.8	1	.8	.1
.8	1.6	1	.6	.11
.6	1.2	1	.2	.111
.2	.4	0	.4	.1110
.4	.8	0	.8	.11100

b. N	Prod	Whole	Fraction	Result
.9	14.4	14	.4	.E
.4	6.4	6	.4	.EE

6.a. A=>1010 C=>1100 . E=>1110 5=>0101

=10101100111100101

b. F=>1111 A=>1010 . C=>1100 E=>1110

=11111010.11001110

c. 0010=>2 1011=>B . 0110=>6 1000=>8 =2B.68

7.a. 2^6 + 2^4 + 2^2 + 2^0 = 85 b. -2^7 + 2^5 + 2^3 + 2^1 = -86

c. (-2^7 + 2^0)/2^4 = -127/16 = -7.9375 d. (-2^7 + 2^4 + 2^2 + 2^1)/2^4 = -106/16 = -6.625

e. (2^6 + 2^5 + 2^4 + 2^3 + 2^2 + 2^1)/2^4 = 126/16 = 7.875

8.a. 6=0110.

N	Prod	Whole	Fraction	Result
.7	1.4	1	.4	.1
.4	.8	0	.8	.10
.8	1.6	1	.6	.101
.6	1.2	1	.2	.1011
.2	.4	0	.4	.10110
.4	.8	0	.8	.101100

6.7=0110.1011 =>1001.0100 => 1001.0101

b. N	Quotient	Remainder	Result
37	18	1	1
18	9	0	01
9	4	1	101
4	2	0	0101
2	1	0	00101
1	0	1	100101

37=>100101

N	Prod	Whole	Fraction	Result
.1	.2	0	.2	.0
.2	.4	0	.4	.00
.4	.8	0	.8	.000
.8	1.6	1	.6	.0001
.6	1.2	1	.2	.00011

37.1=>0100101.00011 =>1011010.11100 =>1011010.11101

c. N	Quotient	Remainder	Result
100	50	0	0
50	25	0	00
25	12	1	100
12	6	0	0100
6	3	0	00100
3	1	1	100100
1	0	1	1100100

100=> 01100100 =>1011011 => 10011100

d. N	Quotient	Remainder	Result
7	3	1	1
3	1	1	11
1	0	1	111

7=>0111 .7=>.1011 7.7=>0111.1011=>1000.0100 =>1000.0101

9.a. 01010101 => 10101010 => 10101011

b. 10101010 => 01010101 => 01010110

c. 1000.0001 => 0111.1110 => 0111.1111
d. 1001.0110 => 0110.1001 => 0110.1010
e. 0111.1110 => 1000.0001 => 1000.0010
10.a. ½^(n-2)
b. ½(8-2) => 1/64
11. Most positive: 011111=> 2^4 + 2^3 + 2^2 + 2^1 + 2^0 = 31
Most negative: 100000 => -2^5 =-32
12. Min: 000000=>0
Max: 111111 => 2^5 + 2^4 +2^3 + 2^2 + 2^1 +2^0 =63
13. If it is unsigned.
14. No, because positive values always start with a zero so their max absolute value is always one less than the max absolute value of negative values.

17. N	Prod	Whole	Fraction	Result
1/6	2/6	0	2/6	.0
2/6	4/6	0	4/6	.00
4/6	8/6	1	2/6	.001
2/6	4/6	0	4/6	.0010
4/6	8/6	1	2/6	.00101
2/6	4/6	0	4/6	.001010
4/6	8/6	1	2/6	.0010101
2/6	4/6	0	4/6	.00101010

.00101010 =>(2^5 + 2^3 + 2^1)/2^8 = 42/256 = 0.1640625
18. max value of 3 fractional decimal digits =.999
.5 + .25 + (.25/2) + (.125/2) + .03125 + .015625 + .0078125 + .00390625 + .001953125 + (.001953125/2) = .9990234375
10 fractional binary digits are needed to have the same resolution as 3 fractional decimal digits.