Number System Homework

Show the steps used in doing each of the conversions.

1. Convert 65129 (decimal) to octal.

2. Convert 114267 (decimal) to hexadecimal.

3. Convert 0.40625 (decimal) to fixed point binary.

4. Convert – 1313.3125 (decimal) to fixed point binary.

5. Convert the 8-bit floating point number represented by the hexadecimal number d 3 to decimal.

6. Convert the 32-bit floating point number represented by the hexadecimal number 44361000 to decimal. (1 bit for the sign, 3 bits for the exponent, 4 bits for the mantissa)

7. Convert – 4.75 to its fixed point format and then to its 8-bit floating point format. (1 bit for the sign, 8 bits for the exponent, 23 bits for the mantissa)

8. Convert 0.40625 to its fixed point format and then to its 8-bit floating point format. (1 bit for the sign, 8 bits for the exponent, 23 bits for the mantissa)

9. Convert – 1313.3125 to its fixed point format and then to its 32-bit floating point format. (1 bit for the sign, 8 bits for the exponent, 23 bits for the mantissa)

10. Convert the following 32-bit floating point number to its decimal equivalent. (1 bit for the sign, 8 bits for the exponent, 23 bits for the mantissa)

0 1 0 0 0 1 0 0 0 0 1 1 0 1 1 0 0 0 0 1 0 0 0 0 0 0 0 0 0 0 0 0

VIGOMAR KIM ALGADOR — HOMEWORK 07

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1. 65129 (decimal) ⟶ **177151** (octal)

	8^5	8^4	8^3	8^2	8^1	8^0
	32768	4096	512	64	8	1
	1	7	7	1	5	1
LEFT:	32361	3689	105	41	1	0

2. 114267 (decimal) ⟶ **18E5B** (Hexadecimal)

	16^4	16^3	16^2	16^1	16^0
	65536	4096	256	16	1
	1	B	E	5	B
LEFT:	48731	3675	91	11	0

3. 0.40625 (decimal) ⟶ fixed point binary

0.40625	x 2	0.8125
0.8125	x 2	1.625
0.625	x 2	1.25
0.25	x 2	0.5
0.5	x 2	1.0

0.01101

4. -1313.3125 (decimal) ⟶ fixed point binary

	2^{10}	2^9	2^8	2^7	2^6	2^5	2^4	2^3	2^2	2^1	2^0
	1024	512	256	128	64	32	16	8	4	2	1
1313:	1	0	1	0	0	1	0	0	0	0	1
	289		33			1					0

0.3125 :

0.3125	x 2	0.625
0.625	x 2	1.25
0.25	x 2	0.5
0.5	x 2	1.0

-1313.3125 = **- 101 0010 0001.0101**

5. 8-bit floating point number d3 (hex) ⟶ (dec)

d3 = 11010011

1	101	0011

Bias value $2^{3-1}-1 = 3$

Exponent : 5 - 3 = 2

1.0011 ⟶ 100.11

decimal : **-4.75**

6. 32-bit floating point number 44361000 (hex) ⟶ (dec)

44361000 = 0100 0100 0011 0110 0001 0000 0000 0000

0	1000 1000	011 0110 0001

1.011 0110 0001

⟶ 10 1101 1000.01

decimal : **728.25**

Bias value : $2^{8-1}-1 = 127$

Exp : 136 - 127 = 9

7. -4.75 ⟶ fixed point format then 8-bit floating point format.

4 ⟶ 0100

0.75 ⟶ 0.11

0100.11 ⟶ 1.0011×2^2

Bias value : $2^{3-1}-1 = 3$

Exp : 2 + 3 = 5

1	101	0011

1101 0011

8. 0.40625 ⟶ fixed point format then 8-bit floating point format.

0.40625	x 2	0.8125
0.8125	x 2	1.625
0.625	x 2	1.25
0.25	x 2	0.5
0.5	x 2	1.0

$0.01101 \longrightarrow 1.101 \times 2^{-2}$

Bias value : $2^{3-1}-1 = 3$

Exp : -2 + 3 = 1

0	001	1010

0001 1010

9. -1313.3125 ⟶ fixed point format then 32-bit floating point format.

	2^{10}	2^9	2^8	2^7	2^6	2^5	2^4	2^3	2^2	2^1	2^0
	1024	512	256	128	64	32	16	8	4	2	1
1313 :	1	0	1	0	0	1	0	0	0	0	1
	289		33			1					0

0.3125 :

0.3125	x2	0.625
0.625	x2	1.25
0.25	x2	0.5
0.5	x2	1.0

-1313.3125 = - 101 0010 0001 . 0101

101 0010 0001 . 0101 ⟶ $1.0100\ 1000\ 0101\ 01 \times 2^{10}$

Bias value : $2^{8-1}-1 = 127$

Exp : 10 + 127 = 137

1	1000 1001	0100 1000 0101 01

1 1000 1001 0100 1000 0101 01

10. | 0 | 1000 1000 | 0110 1100 0010 0000 0000 000 |

Bias value : $2^{8-1}-1 = 127$

Exp : 136 - 127 = 9

$1.0110\ 1100\ 0010\ 0000\ 0000\ 000 \times 2^9$

= 10 1101 1000.01

decimal : 728.25