E = 14

Midterm # 6 scratchwork

a.) Convert to → Base 2, 8, and 16

2.875₁₀ and 0.1796875₁₀

base 16

= 2.E₁₆

.875 x 16 = 14

base 2

= 0010.1110₂

base 8

= 2.7₈

0.101110 x 2^2

base 16

= 0.2E₁₆

0.1796875₁₀ x 16 = 2.875

0.875₁₀ x 16 = 14 (E)

base 2

= 0.00101110₂

base 8

= 0.134₈

0.101110 x 2^{-2}

0.101 1100 | 0 | 0 | 0000 0010

5C000002

b.) Convert to Base → 2, 8, and 16

-2.875

Base 2

1st compliment

00010.1110₂ → 1101.0001₂

2s compliment

1101.0001₂

+ 1

= 1101.0010₂

Base 16

= D.2₁₆

Base 8

= 15.1₈

Nasa Format

1101.0010

1.1010010 x 2^3

= D 2 00 00 03

-0.1796875

Base 2

1st compliment

0.00101110₂ → 1.11010001₂

2s compliment

0.11010001₂

+ 1

= 1.11010010₂

Base 16

= 1.D2₁₆

Base 8

= 1.644₈

Nasa Format

1.111 11010010 x 2^3

1.111 1101 | 0010 0000 | 0 | 0000 0011

FE 20 00 03

NASA Format → Base 10 (Decimal)

(i) 59999901

0.1011001 | 1001 1001 | 1001 1001 | 0000 0001

MANTISSA | POWER

$= 0.1011\,0011\,0011\,0011 \times 2^{1}$

$= 1.0110\,0110\,0110\,011 \times 2^{0}$

$= 1.6\overline{6}_{16}$

$= 1.\overline{6}_{16}$

$= 1 \times 16^{0} + 6 \times 16^{-1} + 6 \times 16^{-2} + 6 \times 16^{-3} + 6 \times 16^{-4} + 6 \times 16^{-5}$

$= 1 + 6/16 + 6/256 + 6/4096 + \cdots$

$= 1.3\overline{9}_{10}$

$\approx 1.4_{10}$

(ii) 59999902

0.1011001 | 1001 1001 | 1001 1001 | 0000 0010

mantissa | power

$= 0.1011001\,1001\,1001\,1001\,1001 \times 2^{2}$

$= 10.1100110011001100110 \times 2^{0}$

$= 2.CCCCC\overline{C}_{16}$

$= 2 \times 16^{0} + 12 \times 16^{-1} + 12 \times 16^{-2} + 12 \times 16^{-3} + \cdots$

$= 2 + \frac{12}{16} + \frac{12}{256} + \frac{12}{4096}$

$= 2.7\overline{9}_{10}$

$\approx 2.8_{10}$

(iii) A66667FE

1.010 0110 | 0110 0110 | 0110 0111 | 1111 1110

mantissa | power

1stomp

$= 1.0100110\,0110\,0110\,0110\,0110$

reg.

$= 0.1011001\,1001\,1001\,1001\,1001 \times 2^{-1}$

$= 0.0101100\,1100\,1100\,1100\,1100\,1 \times 2^{0}$

$= 0.2CCCC\overline{C}_{16}$

1's complement

$= 1111\,1101$

$= 0000\,0010$

$= 2 \times 16^{-1} + 12 \times 16^{-2} + 12 \times 16^{-3} + \cdots + 12 \times 16^{-n} + \cdots$

$= 2/16 + 12/256 + 12/4096 + \frac{12}{16^n}$

$= -0.175_{10}$