

Cameron
Hartling

Prob 6: Conversion to NASA 4 byte float

a) 49.1875

Hex

$$49/16 = 3 \text{ r } 1$$

$$3/16 = 0.3$$

$$= 31_{16}$$

$$31.3_{16}$$

Binary

$$49.1875 \times 2^4 = 787$$

$$787 \% 2 = 1$$

$$393 \% 2 = 1$$

$$98 \% 2 = 0$$

$$49 \% 2 = 0$$

$$24 \% 2 = 1$$

$$12 \% 2 = 0$$

$$6 \% 2 = 0$$

$$3 \% 2 = 0$$

$$1 \% 2 = 1$$

$$0 \% 2 = 1$$

$$= 1100010011 / 2^4$$

$$= 110001.0011$$

Octal

$$49/8 = 6 \text{ r } 1$$

$$6/8 = 0 \text{ r } 6$$

$$= 61_8$$

$$61.4_8$$

$$0.1875 \times 8 = 1.5$$

$$0.5 \times 8 = 4$$

$$= 0.14_8$$

NASA format

$$0.1100010011 \times 2^6$$

$$0110 \ 0010 \ 10010 \ 0000 \ 0000 \ 0000 \ 0000 \ 0110$$

$$6 \ 2 \ 2 \ 0 \ 0 \ 0 \ 0 \ 6$$

$$62200006_{16}$$

3.07421875

Hex

$$\begin{aligned} 3/16 &= 0 \text{ r } 3 & 0.07421875 \times 16 &= 1.1875 \\ &= 3_{16} & 0.1875 \times 16 &= 3 \\ & & &= 0.13_{16} \end{aligned}$$

3.13₁₆

Binary

3.13

11.00010011

Octal

11.00010011

3.046₈

NASA format

$$0.1100010011 \times 2^2$$

0110 0010 | 0011 0000 | 0000 0000 | 0000 0010
6 2 3 0 0 0 0 2

62300002₁₆

0.2

Hex

$$0.2 \times 16 = 3.2$$

$$0.2 \times 16 = 3.2$$

0.3₁₆

Binary

0.0011₂

Octal

$$0.2 \times 8 = 1.6$$

$$0.6 \times 8 = 4.8$$

$$0.8 \times 8 = 6.4$$

$$0.4 \times 8 = 3.2$$

0.1463₈

NASA format

$$0.0011 \times 2^0$$

0001 1001 | 1001 1001 | 1001 1001 | 0000 0000
1 9 9 9 9 9 0 0

19999900₁₆

Q) Convert float into decimal

6 9 9 9 9 9 0 2

0110 1001 1001 1001 1001 1001 0000 0010

$0.1101001_2 \times 2^2$

11.01001_2

to decimal

3.29

$\approx 3.3_{10}$

6 9 9 9 9 9 0 3

0110 1001 1001 1001 1001 1001 0000 0011

$0.11010011001_2 \times 2^2$

110.1001_2

to decimal

6.59

$\approx 6.6_{10}$

966 667 FF

1001 0110 0110 0110 0110 0111 1111 1111

$-0.11010011001100110011001_2 \times 2^{-1}$