Derek Wu
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Djw4yv
In-Lab 4

Part 1:

Converting 8.8125 into little endian binary and expressed in hexadecimal.

1. Find the exponent for base 2 that makes the quotient of 8.8125/(2^n) less than 1.
   a. $\frac{8.8125}{2^3} = 1.101562$
2. Add 127 to 3 to determine the bits for the exponent.
   a. $3 + 127 = 130$
3. Fill in the bits for sign and exponent in IEEE (Big Endian)
   a. **Sign (+) therefore first bit = 0**
   b. **130 = 100 0010**
   c. **First 9 bits = 0100 0001 0**
4. Determine the summation of (1/(2^n)) that equals 0.101562.
   a. **0.101562 =** $\frac{13}{128}$
   b. **Since 1/2 , 1/4, and 1/8 are all larger than 0.101562, start with 1/16**
   c. $\frac{13}{128} = \left(\frac{1}{16}\right) - \left(\frac{1}{32}\right) - (\frac{1}{128})$
5. Fill in the bits for the mantissa
   a. **000 1101 0000 0000 0000 0000**
6. Convert 0100 0001 0000 1101 0000 0000 0000 0000 into Little Endian:
   a. **0000 0000 0000 0000 0000 1101 0100 0001**
7. Convert Little Endian to hex:
   a. **0x00000D81**

Part 2:

Convert 0x00c01ec2 from hex to a floating point number

1. Convert the hexadecimal into binary:
    a. **c = 12, e = 14**
    b. **0000 0000 1100 0000 0001 1110 1100 0010**
2. Convert from Little Endian to Big Endian
    a. **1100 0010 0001 1110 1100 0000 0000 0000**
3. Determine the exponent for the base 2
    a. **100 0010 0 = 132**
    b. **132 – 127 = 5**
    c. **Therefore we know that the mantissa + 1 is multiplied by 2^5**
4. Determine the mantissa
    a. **001 1110 1100 0000 0000 0000 0000**
    b. $\frac{1}{8} + \frac{1}{16} + \frac{1}{32} + \frac{1}{64} + \frac{1}{256} + \frac{1}{512} = 0.240234375$
5. Determine the floating point number:
    a. **–(1 + 0.240234375) * (2^5) = -39.6875**