// Dion Niazi dn3gy 12 02 2017 floatingpoint.pdf

Floating Point number given

1) 19.21875

- First, find the bit representation (in Big Endian) of 19 and of the decimal place
  $19_{10} = 10011_2$
  $21875_{10} = 00111000000000000000_2$
  $19.21875_{10} = 10011.00111000000000000000_2$
- Now move decimal point to the first one on the left
  $10011.00111000000000000000_2$
  $1.00110011100000000000000_2$
- Count the number of times the decimal was moved and add that with 127. This will give you your exponent value.
  Number of times decimal was moved: 4
  Exponent = 4 +127 = 131_{10}
- Convert exponent to binary representation (Big Endian)
  $1\ \ 0\ \ 0\ \ 0\ \ 0\ \ 0\ \ 1\ \ 1_2$
  $2^7\ 2^6\ 2^5\ 2^4\ 2^3\ 2^2\ 2^1\ 2^0$
- Since the number is positive the first bit for the floating point representation will be 0
  Sign bit = 0 (positive)
- Now add exponent (binary) after the sign bit
  $0\,10000011_2$ blue = exponent red = sign
- Now add the bits after the decimal point from the above revised binary representation to the floating point representation
  $0\,10000011\,00110011100000000000000_2$
  Purple = mantissa

- Now that we got the floating point representation in Big Endian notation, we now convert it tot Little Endian by reversing the Bytes

  $01000001100110011100000000000000_2$

  $00000000110000001001100101000001_2$

  $00000000110000001001100101000001_2$
- Now convert Little Endian Floating point representation into Little Endian hexadecimal

  $0x00C09941_{16}$

2) $0x00809EC2_{16}$

- First to make it easy on myself I converted the hexadecimal, which is in Little Endian, into a Big Endian hexadecimal

  $0xC29E8000_{16}$ (Reverse Bytes)

- Now we convert from hexadecimal to binary

  $1100\ 0010\ 1001\ 1110\ 1000\ 0000\ 0000\ 0000_2$
  C 2 9 E 8 0 0 0
- Now assign each bits to its assigned components

  $1100\ 0010\ 1001\ 1110\ 1000\ 0000\ 0000\ 0000_2$

  Sign = first bit = 1 (negative number)
  Exponent = next 8 bits = $10000101_2 = 2^7 + 2^2 + 2^0$
  $= 128 + 4 + 1 = 133 - 127 = 6_{10}$
  Mantissa = $00111101000000000000000_2 = (1/2)^3 + (1/2)^4 + (1/2)^5 + (1/2)^6 + (1/2)^8$
  $= (1/8) + (1/16) + (1/32) + (1/64) + (1/256)$

= 0.23828125 + 1 = 1.23828125

- Now Evaluate with the given components

  $-1 * 2^6 * 1.23828125 = -79.25$