Recitation 4 practice

1. For the IEEE single precision floating point representation (32 bits) what is the representation of the number 46? Show your answer in binary in the form:

   x xxxxxxxx xxxxxxxxxxxxxxxxxxxxxxx and also as 8 hexadecimal digits.

   $46 = [101110] = (1.01110)_2 * 2^5$

   so $E = 5$ and $exp = 5 + 127 = 132 = [10000100]$
   and frac $= 01110000...000$.
   The answer is 0 10000100 01110000000000000000000 = 0100 0010 0011 1000 0000 0000 0000 0000 = $(42380000)_{16}$.

2. For the IEEE single precision floating point representation (32 bits) what is the representation of the number -24.75? Show your answer in binary in the form:

   x xxxxxxxx xxxxxxxxxxxxxxxxxxxxxxx and also as 8 hexadecimal digits

   $24 = [11000] = (1.1)_2 * 2^4$

   $.75 = .11$

   so $-24.75 = (-11000.11)_2 = (-1.100011)_2 * 2^4$

   $127 + 4 = 131 = (10000011)_2$

   The answer is 1 10000011 10011000000000000000000 = 1100 0001 1100 1100 0000 0000 0000 0000 = $(c1cc0000)_{16}$.

3. For the IEEE single precision floating point representation (32 bits) what number os represented by the bit pattern corresponding to: 0x42c2e000?

   $(42c2e000)_{16}$ = (0100 0010 1100 0010 1110 0000 0000 0000)$_2$ = (0 10000101 10000101110000000000000)$_2$
   so exp = $(10000101)_2$ = 133 and E = 133 - 127 = 6, and frac = 100001011100...000,
   and the value is $(1.1000010111)_2 * 2^6 = (1100001.0111)_2 = 97\ 7/16 = 97.4375$.

4. convert the following number to a floating point number:
   sign exp   mantissa
   1   01111101   010...0
   biased exp = 125 − 127 = -2   binary number : $-1.01 * 2^{-2} = (-0.0101)_2 = -0.3125$