

# Quiz #2

**Closed Book**

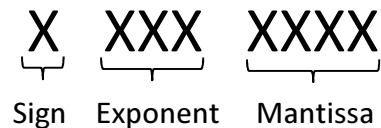
**Individual**

**Tuesday Oct. 11**

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# Arithmetic for Computers

- Define the WiMPY precision IEEE 754 floating point format:



where each 'X' represents one bit, and the bias equals 3.  
Note that exponents 000 and 111 are not reserved.

- 1) What are the largest and smallest values that can be written as normalized WiMPY floating point numbers?
- 2) Convert each of the following normalized WiMPY floating point numbers to decimal (give details of calculus):
  - a) 00000000
  - b) 11011010
  - c) 01110000

# Solution

1) Range of WiMPY precision numbers:

a) Largest value:  $\pm 1.9375 \times 2^4 = \pm 3.1 \times 10^1$

b) Smallest value:  $\pm 1.0 \times 2^{-3} = \pm 1.25 \times 10^{-1}$

2) WiMPY floating point numbers to decimal:

a) 00000000  $\rightarrow (+1) \times (2^{(0-3)}) \times (1.0) = 0.125$

b) 11011010  $\rightarrow (-1) \times (2^{(5-3)}) \times (1.1010) = -6.5$

c) 01110000  $\rightarrow (+1) \times (2^{(7-3)}) \times (1.0000) = 16.0$