

**Floating Point Representation**

Write the following binary numbers in normalized exponential form.

- (i) 111010011.
- (ii) 0.00001110101
- (iii) 1101.001101
- (iv) 111010011.00011010111

If 7 bits in a 16-bit floating point representation are reserved for the mantissa and truncated rather than rounded at 7 bits:

1. Identify the mantissa and the exponent and compute the characteristic if the exponent bias is  $2^7 - 1$  for each of the numbers above. Write the computer representation for each;
  2. Find the computer representation for  $-1871$ .
  3. What will this computer's response be to the test  $1869 > 1861$ ?
  4. What will be the computer's result from the computation  $1872 - 1862$ ?
  5. What will be the computer's result from the computation  $1871.999999999 - 1871.999999999$ ?
  6. Find the 16 bit integer representations for 519 and 514 and their negatives (note that they are both close to  $512 = 2^9$ );
  7. If 519 and 514 are stored as a floating point numbers, find the computer's representations of them and their negatives;
  8. Find this computer's representation of 45592 and -45592;
  9. Find the largest and smallest positive numbers that can be stored in this system.
  10. Repeat the above computations allocating only 4 bits to the characteristic.
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