

# **Introduction to Computer Architecture**

**CISC 3310 Principles of Computer Architecture**  
**Lab Activity**

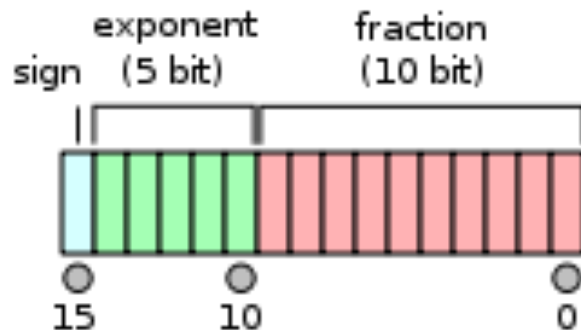
# Data Representation - Exercises

# Signed Numbers

- CB, Chapter 2, Exercise 24 - Using a “word” of 3 bits, list all the possible signed binary numbers and their decimal equivalents that are representable in:
  - a) Signed magnitude
  - b) One’s complement
  - c) Two’s complement
- CB, Chapter 2, Exercise 25 – repeat the previous question using a “word” of 4 bits
- CB, Chapter 2, Exercise 26 - From the results of the previous two questions, generalize the range of values (in decimal) that can be represented in any given  $x$  number of bits the three number representations.

## Example: Using IEEE 754 Floating Point Standard *half-precision binary floating point*

- IEEE 754 *half-precision binary floating point* (or binary16 for short) uses 5 bits for exponents => we get a 15 bias
  - Can represent any exponent between -15 and 16
- Uses 10 bits to the binary fraction



# Floating Point Numbers

- Convert  $100.25_{10}$  to IEEE 754 *half-precision binary floating point*
- Convert 1010011010000000 in IEEE 754 *half-precision binary floating point* representation to a decimal number

## \* CRC Code

- Generate the CRC code for the number 10111011
  - Using the divisor 1011

Questions?

