Learning Objectives [Lecture 4]

- ❏ Number System
  - ❏ Decimal
  - ❏ Binary
  - ❏ Octal
  - ❏ Hexadecimal
- ❏ Class Exercise

Number System

- ❏ Decimal System
- ❏ Has base 10
- ❏ Consists of 10 digits [0,1,2,3,4,5,6,7,8,9]
- ❏ Example: $(4321)_{10}$ = $4*10^3 + 3*10^2 + 2*10^1 + 1*10^0$

Number System

- ❏ Binary System
- ❏ Has base 2
- ❏ Consists of two digits [0,1]
- ❏ Example: $(1011)_2$ = $1*2^3 + 0*2^2 + 1*2^1 + 1*2^0$ = $(11)_{10}$
- ❏ Decimal to Binary Conversion [Division Method]

Number System

- ❏ Octal System
- ❏ Has base 8
- ❏ Consists of two digits [0,1,2,3,4,5,6,7]
- ❏ Useful in UTF8 encoding
- ❏ Example: $(121)_8 = 1*8^2 + 2*8^1 + 1*8^0 = (81)_{10}$
- ❏ Decimal to Octal Conversion
  - ❏ Convert Decimal to Binary and group 3 digits from least significant bit
  - ❏ Or Use the division method like binary

Number System

❏ Hexadecimal System
❏ Has base 16
❏ Consists of two digits [0,1,2,3,4,5,6,7,8,9,A,B,C,D,E,F]
❏ Useful in representing Memory Addresses
❏ Example: $(1AF)_{16}$ = $1*16^2 + 10*16^1 + 15*16^0$ = $(431)_{10}$
❏ Decimal to Octal Conversion
  ❏ Convert Decimal to Binary and group 4 digits from least significant bit
  ❏ Or Use the division method like binary

Class Exercise

1. Convert $(8923)_{10}$ to Binary, Octal, and Hexadecimal systems.
2. Convert $(8923.625)_{10}$ to Binary, Octal, and Hexadecimal systems.

Reading Exercise

1. Fixed Point and Floating Point representation.
   a. https://www.gchamirpur.org/wp-content/uploads/2023/09/Lecture-19-Fixed-and-Floating-Point-Representation.pdf
   b. https://www.youtube.com/watch?v=RuKkePyo9zk
   c. https://www.geeksforgeeks.org/floating-point-representation-basics/?ref=ml_lbp