

# Lecture 10

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# PRACTICE QUESTION

***Convert 74 into binary.***

# Solution

Successive division

$$74 / 2 = 37 \text{ remainder } 0$$

$$37 / 2 = 18 \text{ remainder } 1$$

$$18 / 2 = 9 \text{ remainder } 0$$

$$9 / 2 = 4 \text{ remainder } 1$$

$$4 / 2 = 2 \text{ remainder } 0$$

$$2 / 2 = 1 \text{ remainder } 0$$

$$1 / 1 = 0 \text{ remainder } 1$$

Collect remainder in reverse order (bottom to top)

= binary 1001010

# PRACTICE QUESTION

***Convert 379 into octal***

# Solution

- Solution:  
Successive division  
 $379 / 8 = 47$  remainder 3  
 $47 / 8 = 5$  remainder 7  
 $5 / 8 = 0$  remainder 5
- Collect remainder in reverse order  
= octal 573

# PRACTICE QUESTION

***Convert 984 into Hexadecimal***

# Solution

- Successive division  
 $984 / 16 = 61$  remainder 8  
 $61 / 16 = 3$  remainder 13 (i.e. D)  
 $3 / 16 = 0$  remainder 3
- Collect remainder in reverse order  
= octal 3D8

# PRACTICE QUESTION

10110100110 into octal



# Solution

- *Solution:* Grouping 010 110 100 110
- Convert each group 2 6 4 6
- Therefore, 2646 in octal.

# PRACTICE QUESTION

Convert octal 6125 into binary

# Solution

- Solution: convert each digit 6 1 2 5
- Make 3 bits for each digit 110 001 010 101
- Therefore, 110001010101 is binary equivalent.

# PRACTICE QUESTION

Convert 3A2F into binary

# Solution

- Solution: Convert each digit
- 3 A (10) 2 F (15) [A is 10, B is 11, C is 12, D is 13, E is 14 and F is 15]
- Make 4 bits for each conversion by adding leading zeros
- 0011 1010 0010 1111
- Therefore, 0011101000101111 is the binary equivalent.

# Binary into Hexadecimal

- Example: 1011101001000110
- Solution: Grouping 4 bits from right 1011 1010  
0100 0110
- Convert each group 11 (B) 10(A) 4 6
- Therefore, BA46 is hex equivalent.

## Fractional decimal to octal

Examples:  $(0.3125)_{10}$  convert into octal

	Integer	Fractional
$.3125 * 8 = 2.5$	2	0.5
$0.5 * 8 = 4.0$	4	0

Answer:  **$(0.24)_8$**

Example: convert  $0.356_{10}$  to octal.

$$0.356 * 8 = 2.848 \rightarrow \text{integer part} = 2$$

$$0.848 * 8 = 6.784 \rightarrow \text{integer part} = 6$$

$$0.784 * 8 = 6.272 \rightarrow \text{integer part} = 6$$

$$0.272 * 8 = 2.176 \rightarrow \text{integer part} = 2$$

$$0.176 * 8 = 1.408 \rightarrow \text{integer part} = 1$$

$$0.408 * 8 = 3.264 \rightarrow \text{integer part} = 3, \text{ etc.}$$

Answer =  $0.266213..._8$



# Quick Quiz

- What is the addition of the binary numbers 11011011010 and 010100101?
- a) 0111001000
- b) 1100110110
- c) 11101111111
- d) 10011010011

# Solution

- Answer C

$$\begin{array}{r} \phantom{+} 1 \\ 1\ 1\ 0\ 1\ 1\ 0\ 1\ 1\ 0\ 1\ 0 \\ +\ 0\ 0\ 0\ 1\ 0\ 1\ 0\ 0\ 1\ 0\ 1 \\ \hline 1\ 1\ 1\ 0\ 1\ 1\ 1\ 1\ 1\ 1\ 1 \\ \hline \end{array}$$

# Quick Quiz

- Binary subtraction of  $100101 - 011110$  is?
  - a) 000111
  - b) 111000
  - c) 010101
  - d) 101010

# Solution

- Answer A

$$\begin{array}{rcccccc} 1 & 0 & 0 & 1 & 0 & 1 \\ - & 0 & 1 & 1 & 1 & 1 & 0 \\ \hline 0 & 0 & 0 & 1 & 1 & 1 \\ \hline \end{array}$$

# Quick Quiz

- Perform binary subtraction:  $101111 - 010101$   
= ?
- a) 100100
- b) 010101
- c) 011010
- d) 011001

# Solution

- Answer C

$$\begin{array}{r} 1\ 0\ 1\ 1\ 1\ 1 \\ -\ 0\ 1\ 0\ 1\ 0\ 1 \\ \hline 0\ 1\ 1\ 0\ 1\ 0 \\ \hline \end{array}$$

# Quick Quiz

- On multiplication of (10.10) and (01.01), we get \_\_\_\_\_
- a) 101.0010  
b) 0010.101  
c) 011.0010  
d) 110.0011

# Solution

- Answer C

$$\begin{array}{r} \phantom{x} \phantom{00} \phantom{00} 1 \phantom{00} 0.1 \phantom{00} 0 \\ x \phantom{00} 0 \phantom{00} 1.0 \phantom{00} 1 \\ \hline \phantom{00} \phantom{00} \phantom{00} 1 \phantom{00} 0 \phantom{00} 1 \phantom{00} 0 \\ \phantom{00} \phantom{00} 0 \phantom{00} 0 \phantom{00} 0 \phantom{00} 0 \phantom{00} 0 \\ \phantom{00} 1 \phantom{00} 0 \phantom{00} 1 \phantom{00} 0 \phantom{00} 0 \phantom{00} 0 \\ 0 \phantom{00} 0 \phantom{00} 0 \phantom{00} 0 \phantom{00} 0 \phantom{00} 0 \phantom{00} 0 \\ \hline 0 \phantom{00} 1 \phantom{00} 1.0 \phantom{00} 0 \phantom{00} 1 \phantom{00} 0 \\ \hline \end{array}$$



# Quick Quiz

- Convert binary number into gray code:  
100101.
  - a) 101101
  - b) 001110
  - c) 110111
  - d) 111001

# Solution

- Answer C

