

Topic: Number systems: Binary, Octal, Decimal and Hexadecimal

Due Date: 29 September, 4:00 PM

Instructions:

- You must submit **handwritten solutions** for this assignment on A4 sheets.
- You must write your ID and Full Name on all homework papers.
- You are required to follow the order of problems strictly. Answers out of order would not be marked.
- You are required to show every step of your solution in detail. Simple answers without solutions would result in zero marks.
- You can solve problems using any method explained during lecture and tutorial classes.
- You are required to submit an assignment before the deadline. Late submission would result in zero marks.

Hint: How to convert from any base to any base

1. Convert from source base to decimal (base 10) by multiplying each digit with the base raised to the power of the digit number (starting from right digit number 0):

$$[decimal = \sum (digit * base^{digitnumber})]$$

2. Convert from decimal to destination base: divide the decimal with the base until the quotient is 0 and calculate the remainder each time. The destination base digits are the calculated remainders.

Problem 1

Convert the following binary values to hex:

a) 101101101_2

c) 11110100_2

e) 1001100101_2

b) 11010101_2

d) 100000001_2

f) 11111100010_2

Problem 2

Convert the following hex values to binary:

a) FA_{16}

c) $C4_{16}$

e) 269_{16}

b) 85_{16}

d) $3BE_{16}$

f) $10D_{16}$

Problem 3

Convert the following binary values to octal:

a) 10011111_2

c) 11100001_2

e) 1010100_2

b) 110101100_2

d) 1001011_2

f) 1011110_2

Problem 4

Convert the following octal values to binary:

a) 433_8

c) 34_8

e) 50_8

b) 72_8

d) 203_8

f) 1002_8

Problem 5

Convert the following decimal values to the corresponding base:

a) $572_{10}=?_2$

c) $785_{10}=?_8$

e) $2998_{10}=?_{16}$

b) $2034_{10}=?_2$

d) $2057_{10}=?_8$

f) $35607_{10}=?_{16}$

Problem 6

Convert the following values to decimal:

a) $A12_{16}=?_{10}$

c) $11010011_2=?_{10}$

e) $2047_8=?_{10}$

b) $F03_{16}=?_{10}$

d) $1001101111_2=?_{10}$

f) $11101_8=?_{10}$

Problem 7

Convert the following values:

a) $98A_{16}=?_8$

d) $705_8=?_{16}$

b) $4A0_{16}=?_8$

e) $6304_8=?_{16}$

c) $1FF6_{16}=?_8$

f) $12373_8=?_{16}$

Problem 8

Show 1's complement of the following binary numbers with 9 bits:

a) 101010_2

c) 11010100_2

b) 10011_2

d) 11100110_2

Problem 9

Show 2's complement of the following binary numbers with 9 bits:

a) 101010_2

c) 11010100_2

b) 10011_2

d) 11100110_2

Problem 10

Solve the expressions in binary representation:

a) $53_{10} + 63_{10} = ?_2$

c) $187_{10} - 26_{10} = ?_2$

b) $1101101_2 + 11001_2 = ?_2$

d) $1000111_2 - 100101_2 = ?_2$

Problem 11

Solve the expressions using 2's complement 9-bit binary representation:

a) $168_{10} - 45_{10} = ?_2$

b) $1001100_2 - 100000_2 = ?_2$
