

Exercise series no. 1

Exercise 1

1. What numbering system is predominantly used in computers to represent data internally?
2. What is the largest decimal value that can be represented in binary with n bits?
3. How many unique binary numbers can be represented with n bits?
4. Create a comparison table for the numbers 0 to 15 in decimal, binary, octal, and hexadecimal, showing their respective representations.
5. Among the following notations, indicate which ones are incorrect:
 - $(12)_2$
 - $(14)_{12}$
 - $(\text{BAC2023})_{16}$
 - $(318)_8$
 - $(2\text{A0GF00})_{16}$

Exercise 2

Convert the following numbers:

1. $(54)_{10} = (?)_2$
2. $(18.6875)_{10} = (?)_2$
3. $(564)_{10} = (?)_8$
4. $(36.75)_{10} = (?)_8$
5. $(1564)_{10} = (?)_{16}$
6. $(57.71875)_{10} = (?)_{16}$
7. $(101011101)_2 = (?)_{10}$
8. $(101101.1101)_2 = (?)_{10}$
9. $(745)_8 = (?)_{10}$
10. $(2454.46)_8 = (?)_{10}$
11. $(\text{A9C})_{16} = (?)_{10}$
12. $(\text{C0E,1})_{16} = (?)_{10}$
13. $(23)_5 = (?)_4$
14. $(323,23)_4 = (?)_8$

Exercise 3

1. Convert the following numbers into binary form: $(607)_8$; $(501.4)_8$; $(A8D)_{16}$; $(A4.F)_{16}$
2. Convert the following numbers into octal form: $(10111010)_2$; $(1011.01101)_2$; $(F1E)_{16}$; $(A.3E2F)_{16}$
3. Convert the following numbers into hexadecimal form: $(10110110011101)_2$; $(7106)_8$; $(10110.11001)_2$; $(123.55)_8$

Exercise 4

Perform the following operations:

1. $(1100011)_2 + (10111)_2$
2. $(101010)_2 + (11110)_2 + (101010)_2$
3. $(1011.0011)_2 + (1100.11)_2 + (10010.101)_2$
4. $(274)_8 + (136)_8$
5. $(6AB)_{16} + (A97)_{16}$
6. $(2054)_7 + (156)_7$
7. $(111011)_2 - (11101)_2$
8. $(101100.01)_2 - (10011.011)_2$
9. $(574)_8 - (436)_8$
10. $(A6E)_{16} - (9D)_{16}$
11. $(110110)_2 * (1101)_2$
12. $(274)_8 * (36)_8$
13. $(E4C)_{16} * (A3)_{16}$
14. $(11011010001)_2 / (1011)_2$
15. $(1111100.010111)_2 / (101.01)_2$
16. $(302.3)_4 / (3.2)_4$

Additional exercises:

Exercise 5

Arrange the following numbers in ascending order:

$(11111001)_2$ $(1101)_{10}$ $(1101)_{16}$ $(1000)_{16}$ $(1000)_2$ $(10000)_{10}$

Exercise 6

1. Demonstrate that the binary representation 0.001001 is correct for the decimal fraction 18/128.
2. Determine the base B of the numbers for the following operation to be correct:
 $(75)_B + (46)_B = (132)_B$
3. Given two numbers N1 and N2 in a non-binary base x.
 - a. Show that $N1 = (11)_x$ is a divisor of $N2 = (121)_x$.
 - b. Perform the division of N2 by N1 and express the quotient Q (the result of the division) in both base 3 and base 8.