

Computer Architecture and Networks

Exercise 2a: Number Systems

1) *Convert the following binary numbers to decimal:*

a. $1101 = 13$

b. $01101001 = 105$

c. $1101001110.101 = 846.625$

2) *Convert the following decimal numbers to binary:*

a. $67 = 01000011$

b. $381 = 1011111101$

c. $40.375 = 0101000.011$

3) *Convert the following decimal numbers to 8-bit binary values:*

a. $48 = 00110000$

b. $103 = 01100111$

c. $165 = 10100101$

4) *Convert the following hexadecimal numbers to binary:*

a. $63F = 0110\ 0011\ 1111$

b. $BEEF = 1011\ 1110\ 1110\ 1111$

c. $F00D = 1111\ 0000\ 0000\ 1101$

5) *Convert the following binary numbers to hexadecimal:*

a. $1001\ 0011 = 93$

b. $1010\ 0010\ 1110\ 0101 = A2E5$

c. $1100\ 1001\ 1101\ 1000\ 01 = C9D81$

6) *Convert the following hexadecimal numbers to decimal:*

a. $A7E = 1010\ 0111\ 1110 = 2686$

b. $95BF = 1001\ 0101\ 1011\ 1111 = 38335$

c. $50B = 0101\ 0000\ 1011 = 1291$

7) *Convert the following decimal numbers to hexadecimal:*

a. $46 = 0010\ 1110 = 2E$

b. $139 = 1000\ 1011 = 8B$

c. $2014 = 0111\ 1101\ 1110 = 7DE$

8) *Convert the following octal numbers to binary:*

a. $627 = 110\ 010\ 111$

b. $4550 = 100\ 101\ 101\ 000$

c. $2771 = 010\ 111\ 111\ 001$

9) *Convert the following binary numbers to octal:*

a. $101\ 011\ 001 = 531$

b. $111\ 100\ 000 = 740$

c. $001\ 100\ 101\ 011 = 1453$

10) *Convert the following octal numbers to decimal:*

- a. $45 = 100\ 101 = 37$
- b. $731 = 111\ 011\ 001 = 473$
- c. $173 = 001\ 111\ 011 = 123$

11) *Convert the following decimal numbers to octal:*

- a. $68 = 001\ 000\ 100 = 104$
- b. $99 = 001\ 100\ 011 = 113$
- c. $145 = 010\ 010\ 001 = 221$

12) *Convert each of the following decimal numbers to BCD:*

- a. $8 = 1000$
- b. $39 = 0011\ 1001$
- c. $526 = 0101\ 0010\ 0110$

13) *Convert each of the following BCD numbers to decimal:*

- a. $1001 = 9$
- b. $0010\ 0111 = 27$
- c. $0110\ 0001\ 0100 = 614$

14) *Perform the following arithmetic operations:*

- a. $1101(\text{bs}2) + 1011(\text{bs}2) = 11000$
- b. $00101100(\text{bs}2) + 00010001(\text{bs}2) = 00111101$
- c. $11010(\text{bs}2) - 10111(\text{bs}2) = 00011$
-> PROBLEM d. $1110(\text{bs}2) - 11(\text{bs}2) = 111$
- d. $37(\text{bs}16) + 29(\text{bs}16) = 0011\ 0111 + 0010\ 1001 = 60(\text{bs}16)$

- e. $A0(\text{bs16}) + 6B(\text{bs16}) = 1010\ 0000 + 0110\ 1011 = 0001\ 0000\ 1011 = 10B$
- f. $C8(\text{bs16}) - 3A(\text{bs16}) = 1100\ 1000 - 0011\ 1010 = 1000\ 1110 = 8E$
- g. $FD(\text{bs16}) - 88(\text{bs16}) = 1111\ 1101 - 1000\ 1000 = 0111\ 0101 = 75$

11111101 01111000 ——— 101110101