

CPE/EEE 64 PAL Worksheet ECS, CSUS

NUMBER SYSTEMS WORKSHEET

Example 1) Convert the binary number $(11010)_2$ to decimal.

$$(11010)_2 = 1 \times 2^4 + 1 \times 2^3 + 0 \times 2^2 + 1 \times 2^1 + 0 \times 2^0 = 16 + 8 + 2 = (26)_{10}$$

- 1) Convert the binary number $(11001)_2$ to decimal.
- 2) Convert the binary number $(1011010111)_2$ to decimal.

Example 2) Convert the binary number $(110101.11)_2$ to decimal.

$$(110101.11)_2 = 1 \times 2^5 + 1 \times 2^4 + 0 \times 2^3 + 1 \times 2^2 + 0 \times 2^1 + 1 \times 2^0 + 1 \times 2^{-1} + 1 \times 2^{-2} = 32 + 16 + 4 + 1 + 0.5 + 0.25 = (53.75)_{10}$$

- 3) Convert the binary number $(1010011.101)_2$ to decimal.
- 4) Convert the binary number $(10101110.1001)_2$ to decimal.

Example 3) Convert the decimal number $(625)_{10}$ to binary

$$625 - 512 = 113 = N_1 \quad (512 = 2^9)$$

$$113 - 64 = 49 = N_2 \quad (64 = 2^6)$$

$$49 - 32 = 17 = N_3 \quad (32 = 2^5)$$

$$17 - 16 = 1 = N_4 \quad (16 = 2^4)$$

$$1 - 1 = 0 = N_5 \quad (1 = 2^0)$$

$$(625)_{10} = 2^9 + 2^6 + 2^5 + 2^4 + 2^0 = (1001110001)_2$$

- 5) Convert the decimal number $(45)_{10}$ to binary.
- 6) Convert the decimal number $(20486)_{10}$ to binary.

CPE/EEE 64 PAL Worksheet ECS, CSUS

Example 4) Convert the decimal number $(0.6875)_{10}$ to Binary

$0.6875 \times 2 = 1.3750$	Integer = 1	↓	(MSB)
$0.3750 \times 2 = 0.7500$	Integer = 0		
$0.7500 \times 2 = 1.5000$	Integer = 1		
$0.5000 \times 2 = 1.0000$	Integer = 1		(LSB)

$(0.6875)_2 = (0.1011)_2$

7) Convert the decimal number $(0.3125)_{10}$ to Binary.

8) Convert the decimal number $(175.175)_{10}$ to Binary.

Example 5) Convert the hexadecimal number $(B2)_{16}$ to binary.

$B = 1011$

$2 = 0010$

$(B2)_{16} = (10110010)_2$

9) Convert the hexadecimal number $(E7C)_{16}$ to binary.

10) Convert the hexadecimal number $(F3C7.A)_{16}$ to binary.

Example 6) Convert the binary number $(11011)_2$ to hexadecimal.

$0001\ 1011 = 1\ B$

$(11011)_2 = (1B)_{16}$

11) Convert the binary number $(10111101.101)_2$ to hexadecimal.

Example 7) Convert the decimal number 20 to hexadecimal.

$20/16 = 1$ Remainder = 4 ↑ (LSB)

$1/16 = 0$ Remainder = 1 (MSB)

$(20)_{10} = (14)_{16}$

CPE/EEE 64 PAL Worksheet ECS, CSUS

12) Convert the decimal number $(369)_{10}$ to hexadecimal.

Example 8) Convert the hexadecimal number 2C to decimal.

A = 10 B = 11 C = 12 D = 13 E = 14 F = 15

$$2C = 2 \times 16^1 + 12 \times 16^0 = 32 + 12 = 44$$

13) Convert the hexadecimal number $(F3C7.A)_{16}$ to decimal.

14) Convert the hexadecimal number $(D6.A)_{16}$ to decimal.

Example 9) Convert the decimal number 153 to octal

$153/8 = 19$	Remainder = 1	↑	(LSB)
$19 /8 = 2$	Remainder = 3		
$2 /8 = 0$	Remainder = 2		(MSB)

$$(153)_{10} = (231)_8$$

15) Convert the decimal number $(214)_{10}$ to its octal equivalent.

16) Convert the decimal number $(7562.45)_{10}$ to its octal equivalent.

Example 10) Convert the octal number $(561.24)_8$ to decimal number.

$$561.24 = 5 \times 8^2 + 6 \times 8^1 + 1 \times 8^0 + 2 \times 8^{-1} + 4 \times 8^{-2} = 320 + 48 + 1 + 0.25 + 0.0625 = 369.3125$$

$$(561.24)_8 = (369.3125)_{10}$$

17) Convert the octal number $(275.5)_8$ to decimal number.

Example 11) Convert the octal number $(561.24)_8$ to its binary equivalent.

$$(561.24)_8 = (101110001.010100)_2$$

18) Convert the octal number $(275.5)_8$ to its binary equivalent.

CPE/EEE 64 PAL Worksheet ECS, CSUS

Example 12) Convert the octal number $(561.24)_8$ to Hexadecimal Equivalent.

$$(561.24)_8 = (101110001.010100)_2$$

$$(000101110001.01010000)_2 = (171.50)_{16}$$

19) Convert the octal number $(275.5)_8$ to its Hexadecimal equivalent.