
**Problem Solutions to Problems Marked With a * in
Logic Computer Design Fundamentals, Ed. 2**

CHAPTER 1

© 2000 by Prentice-Hall, Inc.

1-1.

Decimal, Binary, Octal and Hexadecimal Numbers from $(16)_{10}$ to $(31)_{10}$

| | | | | | | | | | | | | | | | | |
|-----|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| Dec | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 31 |
| Bin | 1 0000 | 1 0001 | 1 0010 | 1 0011 | 1 0100 | 1 0101 | 1 0110 | 1 0111 | 1 1000 | 1 1001 | 1 1010 | 1 1011 | 1 1100 | 1 1101 | 1 1110 | 1 1111 |
| Oct | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 30 | 31 | 32 | 33 | 34 | 35 | 36 | 37 |
| Hex | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 1A | 1B | 1C | 1D | 1E | 1F |

1-4.

$$(1101001)_2 = 2^6 + 2^5 + 2^3 + 2^0 = 105$$

$$(10001011.011)_2 = 2^7 + 2^3 + 2^1 + 2^0 + 2^{-2} + 2^{-3} = 139.375$$

$$(10011010)_2 = 2^7 + 2^4 + 2^3 + 2^1 = 154$$

1-7.

| Decimal | Binary | Octal | Hexadecimal |
|-----------|----------------------|----------|-------------|
| 369.3125 | 101110001.0101 | 561.24 | 171.5 |
| 189.625 | 10111101.101 | 275.5 | BD.A |
| 214.625 | 11010110.101 | 326.5 | D6.A |
| 62407.625 | 1111001111000111.101 | 171707.5 | F3C7.A |

1-9.

$$\begin{aligned} \text{a) } 7562/8 &= 945 + 2/8 &\rightarrow 2 \\ 945/8 &= 118 + 1/8 &\rightarrow 1 \\ 118/8 &= 14 + 6/8 &\rightarrow 6 \\ 14/8 &= 1 + 6/8 &\rightarrow 6 \\ 1/8 &= 1/8 &\rightarrow 1 \end{aligned}$$

$$\begin{aligned} 0.45 \times 8 &= 3.6 &\rightarrow 3 \\ 0.60 \times 8 &= 4.8 &\rightarrow 4 \\ 0.80 \times 8 &= 6.4 &\rightarrow 6 \\ 0.20 \times 8 &= 3.2 &\rightarrow 3 \end{aligned}$$

$$(7562.45)_{10} = (16612.3463)_8$$

$$\text{b) } (1938.257)_{10} = (792.41CA)_{16}$$

$$\text{c) } (175.175)_{10} = (10101111.001011)_2$$

Problem Solutions – Chapter 1

1-11.

$$\begin{aligned}
 \text{a) } (673.6)_8 &= (110\ 111\ 011.110)_2 \\
 &= (1BB.C)_{16} \\
 \text{b) } (E7C.B)_{16} &= (1110\ 0111\ 1100.1011)_2 \\
 &= (7174.54)_8 \\
 \text{c) } (310.2)_4 &= (11\ 01\ 00.10)_2 \\
 &= (64.4)_8
 \end{aligned}$$

1-15.

$$\begin{aligned}
 \text{a) } (BEE)_r &= (2699)_{10} \\
 11 \times r^2 + 14 \times r^1 + 14 \times r^0 &= 2699 \\
 11 \times r^2 + 14 \times r - 2685 &= 0 \\
 \text{By the quadratic equation: } r &= 15 \text{ or } r \approx -16.27 \\
 \text{ANSWER: } r &= 15 \\
 \text{b) } (365)_r &= (194)_{10} \\
 3 \times r^2 + 6 \times r^1 + 5 \times r^0 &= 194 \\
 3 \times r^2 + 6 \times r - 189 &= 0 \\
 \text{By the quadratic equation: } r &= -9 \text{ or } 7 \\
 \text{ANSWER: } r &= 7
 \end{aligned}$$

1-17.

$$\begin{array}{rcl}
 (694)_{10} & = & (0110\ 1001\ 0100)_{BCD} \\
 (835)_{10} & = & (1000\ 0011\ 0101)_{BCD} \\
 & & \begin{array}{l} \leftarrow 1 \\ \begin{array}{ccc} 0110 & 1001 & 0100 \\ \underline{+1000} & \underline{+0011} & \underline{+0101} \\ 1111 & 1100 & 1001 \\ \underline{+0110} & \underline{+0110} & \underline{+0000} \\ 0001\ 0101 & 1\ 0010 & 1001 \end{array} \end{array}
 \end{array}$$

1-20.

$$\begin{aligned}
 \text{a) } (0100\ 1000\ 0110\ 0111)_{BCD} &= (4867)_{10} \\
 &= (1001100000011)_2 \\
 \text{b) } (0011\ 0111\ 1000.0111\ 0101)_{BCD} &= (378.75)_{10} \\
 &= (101111010.11)_2
 \end{aligned}$$

1-23.

$$\begin{aligned}
 \text{a) } (101101101)_2 \\
 \text{b) } (0011\ 0110\ 0101)_{BCD} \\
 \text{c) } 0011\ 0011 \quad 0011\ 0110 \quad 0011\ 0101_{ASCII}
 \end{aligned}$$

1-25.

BCD Digits with Odd and Even Parity

| | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
|------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| Odd | 1 0000 | 0 0001 | 0 0010 | 1 0011 | 0 0100 | 1 0101 | 1 0110 | 0 0111 | 0 1000 | 1 1001 |
| Even | 0 0000 | 1 0001 | 1 0010 | 0 0011 | 1 0100 | 0 0101 | 0 0110 | 1 0111 | 1 1000 | 0 1001 |