Solutions to Problems Marked with a * in
Logic and Computer Design Fundamentals, 4th Edition

Chapter 1

1-3*

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

1-7*

$(1001101)_2 = 2^6 + 2^3 + 2^2 + 2^0 = 77$

$(1010011.101)_2 = 2^6 + 2^4 + 2^1 + 2^0 + 2^{-1} + 2^{-3} = 83.625$

$(10101110.1001)_2 = 2^7 + 2^5 + 2^3 + 2^2 + 2^1 + 2^{-1} + 2^{-4} = 174.5625$

1-9*

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

1-10*

a)

8|7562 2 ↑ 16612
8|945 1
8|118 6
8|14 6
8|1 1
0

$0.45 \times 8 = 3.6 \Rightarrow 3$
$0.60 \times 8 = 4.8 \Rightarrow 4$
$0.80 \times 8 = 6.4 \Rightarrow 6$
$0.20 \times 8 = 3.2 \Rightarrow 3$ → 3463

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

b) $(1938.257)_{10} = (792.41CB)_{16}$

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

1-11*

a) $(673.6)_8 = (110\ 111\ 011.110)_2$
$= (1BB.C)_{16}$

b) $(E7C.B)_{16} = (1110\ 0111\ 1100.1011)_2$
$= (7174.54)_8$

c) $(310.2)_4 = (11\ 01\ 00.10)_2$
$= (64.4)_8$

1-16*

a) $(BEE)_r = (2699)_{10}$

$11 \times r^2 + 14 \times r^1 + 14 \times r^0 = 2699$

$11 \times r^2 + 14 \times r - 2685 = 0$

By the quadratic equation: $r = 15$ or ≈ -16.27

ANSWER: $r = 15$

b) $(365)_r = (194)_{10}$

$3 \times r^2 + 6 \times r^1 + 5 \times r^0 = 194$

$3 \times r^2 + 6 \times r - 189 = 0$

By the quadratic equation: $r = -9$ or 7

ANSWER: r = 7

1-18*

a) $(0100\ 1000\ 0110\ 0111)_{BCD} = (4867)_{10} = (1001100000011)_2$

b) $(0011\ 0111\ 1000.0111\ 0101)_{BCD} = (378.75)_{10} = (101111010.11)_2$

1-19*

$(694)_{10} = (0110\ 1001\ 0100)_{BCD}$

$(835)_{10} = (1000\ 0011\ 0101)_{BCD}$

	1 ←		
	0110	1001	0100
	+1000	+0011	+0101
	1111	1100	1001
	+0110	+0110	+0000
0001	0101	1 0010	1001

1-20*

(a)

	10^1	10^0		
	0111	1000		
Move R	011	1100	0	10^0 column > 0111
Subtract 3		-0011		
	011	1001	0	
Subtract 3		-0011		
	01	1001		
Move R	0	1100	110	10^0 column > 0111
Subtract 3		-0011		
	0	1001	110	
Move R		0100	1110	
Move R		010	01110	
Move R		01	001110	
Move R		0	1001110	Leftmost 1 in BCD number shifted out: Finished

(b)

	10^2	10^1	10^0		
	0011	1001	0111		
Move R	001	1100	1011	1	10^1 and 10^0 columns > 0111
Subtract 3		-0011	-0011		
	001	1001	1000	1	
Move R	00	1100	1100	01	10^1 and 10^0 columns > 0111
Subtract 3		-0011	-0011		
	00	1001	1001	01	
Move R	0	0100	1100	101	10^0 column > 0111
Subtract 3			-0011		
	0	0100	1001		
Move R		0010	0100	1101	
Move R		001	0010	01101	
Move R		00	1001	001101	100 column > 0111
Subtract 3			-0011		
		00	0110	001101	
Move R		0	0011	0001101	
Move R			0001	10001101	
Move R			000	110001101	Leftmost 1 in BCD number shifted out: Finished

1-25*

a) $(11111111)_2$

b) $(0010\ 0101\ 0101)_{BCD}$

c) $011\ 0010 \quad 011\ 0101 \quad 011\ 0101_{ASCII}$

d) $0011\ 0010 \quad 1011\ 0101 \quad 1011\ 0101_{ASCII\ with\ Odd\ Parity}$