



## Chapter 1

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### Digital Systems and Binary Information

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## §1-2

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1. Convert the following numbers with the indicated bases to decimal:

(a)  $(132.3)_4$

(b)  $(425.3)_6$

EX-2

2



## §1-2

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2. In each of the following cases, determine the radix  $r$ :

(a)  $(24)_r = (18)_{10}$

(b)  $(231)_r = (91)_{10}$

EX-3

3



## §1-2

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3. Perform the following binary arithmetic operations:

(a) i.  $1011 + 0110$       ii.  $110 \times 011$

(b) i.  $1011001 + 1011010$       ii.  $01101 \times 11011$

EX-4

4



### §1-3 & 1-4

4. Convert the following numbers from the given base to the other three bases listed in the table.

(a)


Decimal	Binary	Octal	Hexadecimal
19.5	?	?	?
?	?	63.75	?

(b)

Decimal	Binary	Octal	Hexadecimal
237.875	?	?	?
?	?	156.375	?

EX-5

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### §1-5

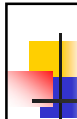
5. Obtain the 1's and 2's complements of the following 8-bit binary numbers:

(a) 01000110, 11011010

(b) 01010011, 10011000

EX-6

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### §1-5

6. (a)

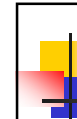
- Perform the indicated subtraction with the following unsigned binary numbers by 1's complement addition:  
 $11101 - 10001$        $00101 - 10100$
- Perform the indicated subtraction with the following unsigned binary numbers by 2's complement addition:  
 $11101 - 10001$        $00101 - 10100$

(b) Repeat (a) for

- $10110101 - 01001101$ ,  $01001101 - 10110101$
- $10110101 - 01001101$ ,  $01001101 - 10110101$

EX-7

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### §1-6

7. (a) The following binary numbers have a sign in the leftmost position and, if negative, are in 2's complement form. Perform the indicated arithmetic operations and indicate if **overflow** occurs for each computation. (Hint: Perform subtraction by 2's complement addition.)

- $001011 + 100110$       ii.  $110001 - 010010$

(b) Repeat (a) for

- $10110101 - 01001101$       ii.  $01001101 + 10110101$

EX-8

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## s1-7

8. (a) Represent the decimal numbers 25 and 87 in BCD, and then show the steps necessary to form their sum.
- (b) Represent the decimal numbers 376 and 843 in BCD, and then show the steps necessary to form their sum.

EX-9

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## Brief Answers of the Exercises (1/2)

1. (a) 30.75  
(b) 161.5
2. (a) 7  
(b) 6
3. (a) i. 10001    ii. 10010  
(b) i. 10110011    ii. 101011111
4. (a)  $(19.5)_{10} = (10011.1)_2 = (23.4)_8 = (13.8)_{16}$   
 $(63.75)_8 = (51.953125)_{10} = (110011.111101)_2 = (33.F4)_{16}$   
(b)  $(237.875)_{10} = (11101101.111)_2 = (355.7)_8 = (ED.E)_{16}$   
 $(156.375)_8 = (110.494140625)_{10} = (1101110.011111101)_2 = (6E.7E8)_{16}$

EX-10

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## Brief Answers of the Exercises (2/2)

5. (a) i. 10111001, 10111010    ii. 00100101, 00100110  
(b) i. 10101100, 10101101    ii. 01100111, 01101000
6. (a) i. 01100, -01111    ii. 01100, -01111  
(b) i. 01101000, -01101000    ii. 01101000, -01101000
7. (a) i. 110001    ii. Overflow  
(b) i. overflow    ii. 00000010
8. (a) 000100010010<sub>BCD</sub>  
(b) 0001001000011001<sub>BCD</sub>

EX-11

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