

Chapter 1 - Binary Numbers and Codes - Examples

1.1 Convert the following decimal numbers to equivalent binary numbers.

- (a) 43 (b) 64 (c) 4096
(d) 0.375 (e) $\frac{27}{32}$ (f) 0.4375
(g) 512.5 (h) 131.5625 (i) 2048.0625

1.2 Convert the following binary numbers to equivalent decimal numbers.

- (a) 1101 (b) 11011 (c) 1011
(d) 0.1011 (e) 0.001101 (f) 0.001101101
(g) 111011.1011 (h) 1011011.001101 (i) 10110.0101011101

1.3 Convert the following decimal numbers to equivalent octal numbers.

- (a) 932 (b) 332 (c) 545.375
(d) 632.97 (e) 4429.625

1.4 Convert the following octal numbers to equivalent decimal numbers.

- (a) 2376 (b) 2473 (c) 276431 (d) 22632

1.5 Convert the following hexadecimal numbers to equivalent decimal numbers.

- (a) B6C7 (b) 64AC (c) A492 (d) D2763

1.6 Convert the following binary numbers to equivalent octal numbers.

- (a) 101101 (b) 101101110 (c) 10110111
(d) 110110.011 (e) 011.1011011

1.7 Convert the following binary numbers to equivalent hexadecimal numbers.

- (a) 10110111 (b) 10011110 (c) 1001111
(d) 0.01111110 (e) 101101111010

1.8 Perform the following additions and check by converting the binary numbers to decimal:

- (a) 1101.1 + 1011.1 (b) 101101 + 1101101 (c) 0.0011 + 0.1110
(d) 1100.011 + 1011.011

1.9 Perform the following subtractions in the binary number system:

- (a) 64 - 32 (b) 127 - 63 (c) 93.5 - 42.75
(d) $84\frac{9}{32} - 48\frac{5}{16}$

1.10 Convert the following binary numbers to both their 1's and 2's complements:

- (a) 101111 (b) 100100 (c) 10111.10 (d) 10011.11

1.11 Perform the following subtractions using both 1s and 2s complements:

(a) $1011 - 101$ (b) $11011 - 11001$ (c) $10111.1 - 10011.1$

(d) $11011 - 10011.11$

1.13 How many different binary numbers can be stored in a register consisting of six switches (bits)?

1.14 Write the first 10 numbers in the quaternary number system, which has a base, or radix of 4. Use the digits 0, 1, 2, and 3 to express these numbers.

1.15 If a binary computer handles numbers in the sign-plus-magnitude integer system and numbers are 5 bits (sign plus 4 bits) each, how would the following decimal numbers be represented? For example, $+5 = 00101$.

(a) $+6$

(b) $+10$

(c) -12

(d) -16