Problem 14. Convert the following decimal numbers into their hexadecimal equivalents: (a) 37_{10} (b) 108_{10}

(a) 16 | 37 Remainder

16 | 2 $5 = 5_{16}$

0 $2 = 2_{16}$

most significant bit → 2 5 ← least significant bit

Hence $37_{10} = 25_{16}$

(b) 16 | 108 Remainder

16 | 6 $12 = C_{16}$

0 $6 = 6_{16}$

6 C

Hence $108_{10} = 6C_{16}$

Problem 15. Convert the following decimal numbers into their hexadecimal equivalents: (a) 162_{10} (b) 239_{10}

(a) 16 | 162 Remainder

16 | 10 $2 = 2_{16}$

0 $10 = A_{16}$

A 2

Hence $162_{10} = A2_{16}$

(b) 16 | 239 Remainder

16 | 14 $15 = F_{16}$

0 $14 = E_{16}$

E F

Hence $239_{10} = EF_{16}$

To convert from binary to hexadecimal:

The binary bits are arranged in groups of four, starting from right to left, and a hexadecimal symbol is assigned to each group. For example, the binary number 1110011110101001

is initially grouped in fours as: 1110 0111 1010 1001

and a hexadecimal symbol assigned E 7 A 9

to each group from Table 5.2

Hence **$1110011110101001_2 = E7A9_{16}$**

To convert from hexadecimal to binary:

The above procedure is reversed, thus, for example,

$6CF3_{16} = 0110\ 1100\ 1111\ 0011$ from Table 5.2

i.e. **$6CF3_{16} = 110110011110011_2$**

Problem 16. Convert the following binary numbers into their hexadecimal equivalents:

(a) 11010110_2 (b) 1100111_2

(a) Grouping bits in fours from the right gives: 0101 0110

and assigning hexadecimal symbols to each group gives: D 6 from Table 5.2

Thus, $11010110_2 = D6_{16}$

(b) Grouping bits in fours from the right gives: 0110 0111

and assigning hexadecimal symbols to each group gives: 6 7 from Table 5.2

Thus, $1100111_2 = 67_{16}$

Problem 17. Convert the following binary numbers into their hexadecimal equivalents:

(a) 11001111_2 (b) 110011110_2

(a) Grouping bits in fours from the right gives: 1100 1111

and assigning hexadecimal symbols to each group gives: C F from Table 5.2

Thus, $11001111_2 = CF_{16}$

(b) Grouping bits in fours from the right gives: 0001 1001 1110

and assigning hexadecimal symbols to each group gives: 1 9 E from Table 5.2

Thus, $110011110_2 = 19E_{16}$

Problem 18. Convert the following hexadecimal numbers into their binary equivalents: (a) $3F_{16}$ (b) $A6_{16}$

(a) Spacing out hexadecimal digits gives: 3 F

and converting each into binary gives: 0011 1111 from Table 5.2

Thus, $3F_{16} = 111111_2$