

Lebanese American University
School of Arts and Sciences
Department of Computer Science and Mathematics

CSC 320 – Computer Organization

Problem Set 1: Number Systems

Problem 1. Perform the following number system conversions:

- (a) $1101011_2 = ?_{16}$
- (b) $10100.1101_2 = ?_{16}$
- (c) $101111.0111_2 = ?_8$

Solution:

- (a) $1101011 = 6B_{16}$
- (b) $10100.1101 = 14.D_{16}$
- (c) $101111.0111 = 57.34_8$

Problem 2. Convert the following octal numbers into binary and hexadecimal:

- (a) $1234_8 = ?_2 = ?_{16}$
- (b) $365517_8 = ?_2 = ?_{16}$
- (c) $7436.11_8 = ?_2 = ?_{16}$

Solution:

- (a) $1234_8 = 1010011100_2 = 29C_{16}$
- (b) $365517_8 = 11110101101001111_2 = 1EB4F_{16}$
- (c) $7436.11_8 = 111100011110.001001_2 = F1E.24_{16}$

Problem 3. Convert the following hexadecimal numbers into binary and octal:

- (a) $1023_{16} = ?_2 = ?_8$
- (b) $ABCD_{16} = ?_2 = ?_8$
- (c) $9E36.7A_{16} = ?_2 = ?_8$

Solution:

- (a) $1023_{16} = 1000000100011_2 = 10043_8$
- (b) $ABCD_{16} = 1010101111001101_2 = 125715_8$
- (c) $9E36.7A_{16} = 1001111000110110.0111101_2 = 117066.364_8$

Problem 4. Convert the following numbers into decimal:

(a) $12010_3 = ?_{10}$

(b) $7156_8 = ?_{10}$

(c) $15C.38_{16} = ?_{10}$

Solution:

(a) $12010_3 = 138_{10}$

(b) $7156_8 = 3694_{10}$

(c) $15C.38_{16} = 348.21875_{10}$

Problem 5. Perform the following number-system conversions:

(a) $125_{10} = ?_2$

(b) $727_{10} = ?_5$

(c) $1435_{10} = ?_8$

Solution:

(a) $125_{10} = 1111101_2$

(b) $727_{10} = 10402_5$

(c) $1435_{10} = 2633_8$

Problem 6. Each of the following arithmetic operations is correct in at least one number system. Determine possible radices of the numbers in each operation.

(a) $1234 + 5432 = 6666$

(b) $41 / 3 = 13$

(c) $33 / 3 = 11$

(d) $23 + 44 + 14 + 32 = 223$

(e) $302 / 20 = 12.1$

(f) $\sqrt{41} = 5$

Solution:

(a) any $b > 6$

(b) $b = 8$

(c) any $b > 3$

(d) $b = 5$

(e) $b = 4$

(f) $b = 6$