CS 226

Computer Organization and Design

Fall 2024

Assignment #3

Data Representation & Number Conversions

Due date: Friday, September 6, 2024

General instructions:

This assignment is based on the material on data representation. As a reminder, hexadecimal values must be stated with the 0x prefix. All binary values should be stated with the number of bits (byte, halfword, word) necessary to correctly represent the value. Apply sign extension when necessary to represent the correct value. Show all your work where applicable.

***Section 1:*** all numeric values in this section are to be interpreted as ***unsigned integers***. (2 points for each question)

1. Convert the decimal number [ 161 ] to binary and hexadecimal.

2. Convert the binary number [ 1 0 0 0 0 1 0 0 1 1 0 0 1 0 1 0 ] to decimal and hexadecimal.

3. Convert the hexadecimal number [ 0x7b4f ] to decimal and binary.

***Section 2:*** all numeric values in this section are to be interpreted as ***signed integers***. (2 points for each question)

4. Convert the decimal number [ 132 ] into binary and hexadecimal.

5. Convert the decimal number [ – 463 ] into binary and hexadecimal.

6. Convert the binary number [ 01011001 ] into hexadecimal and decimal.

7. Convert the binary number [ 10101101 ] into hexadecimal and decimal.

8. Convert the hexadecimal number [ 0x3c9a ] into binary and decimal.

9. Convert the hexadecimal number [ 0x9fde ] into binary and decimal.

***Section 3:*** character representation.

10. What sequence of characters is represented by the following binary numbers when read from left to right? (1 point each character)

01000011 01011111 00111001 01100010 00111101

Submit this assignment on Blackboard. Ideally, you should submit a typewritten document in text, Word or PDF format. I will accept a scanned, handwritten copy but it must have a high contrast (use black ink on white paper). Each question should be clearly numbered and in the correct order 1 – 10. Please write legibly! You do not have to submit a copy of the assignment pages. Don’t forget the honor code.