Homework Assignment #1

Assigned: 10/10/2021
Due: 17/10/2021 11:55 PM
Notes:

- **Do not upload this document anywhere. Distribution of this document is not allowed.**
- Submit your work on SuCourse+. You can write on paper, take a picture and upload it on SuCourse+. Please submit a single pdf document.
- Show your solutions clearly.
- Late submission policy:
    - If you miss the deadline, 20% will be deducted from your grade. After every 24 hours, another 20% will be deducted. For example, if you receive 90 out of the 100 points, and you are 40 hours late, your final grade will be 54 points.
    - After 4 days, solutions will be posted on SuCourse+.

Q1) The following is a string of ASCII characters whose bit patterns have been converted into hexadecimal for compactness: E3 73 B3 B0 B3 20 68 F7 31 20 F1 31. Of the eight bits in each pair of digits, the leftmost is a parity bit. The remaining bits are the ASCII code.

(a) (10) Convert the string to bit form and decode the ASCII.
(b) (10) Determine the parity used: odd or even?

Q2) (10) List the ASCII code for the 10 decimal digits with an odd parity bit in the leftmost position.

Q3) Realize the following operations using 8-digit 2's complement signed number system. Verify the correctness of your operation by converting the result from 2's complement signed number system to decimal.

(a) (5) 127-1
(b) (5) 30+(-71)
(c) (5) 30-(-71)
(d) (5) -60-(-127)
(e) (5) 39.5-41.75
(f) (5) 41.84375-80.15625

Q4) (20) You are asked to design a number system that realizes arithmetic modulo 64.
For example:
(32 + 48) % 64 = 16
(32 - 48) % 64 = 48

Which number system would you use?

Q5) (20) Calculate the binary equivalent of 1/7 using only eight (4) bits in the fraction. Then convert the resulting binary number back to decimal. What is the error (if there is any) in the binary representation?