

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 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?