

Assignment 1: Computer Arithmetic, Fall 2020

Due: 10pm, Wednesday, Sept 30, 2020

Requirements:

- Organize your assignment solution into one single file in Microsoft Word format or PDF. Note that image format (incl. jpg etc) is not acceptable, however, you may convert jpg files to one single pdf file and then submit it.
 - Submission must be conducted on-line through Blackboard website.
1. (10 marks) If an unsigned decimal integer of n -digit is converted into binary number representation, how many bits are there in the binary representation?
 2. (15 marks) Convert decimal number $(50.6875)_{10}$ to binary representation.
 3. (15 marks) Represent decimal numbers $(50.6875)_{10}$ and $(-50.6875)_{10}$ in sign-magnitude method for $k = 8$ and $m = 4$, where k and m indicate the number of integer bits (including sign bit) and fraction bits in the representation, respectively.
 4. (15 marks) Represent decimal numbers $(50.6875)_{10}$ and $(-50.6875)_{10}$ in biased (with Bias = 128) method for $k = 8$ and $m = 4$, where k and m indicate the number of integer bits and fraction bits in the representation, respectively.
 5. (15 marks) Represent decimal numbers $(50.6875)_{10}$ and $(-50.6875)_{10}$ in binary 2's complement representations for $k = 8$ and $m = 4$, where k and m indicate the number of integer and fraction bits in the representation, respectively.
 6. (15 marks) Represent decimal numbers $(50.6875)_{10}$ and $(-50.6875)_{10}$ in binary 1's complement representations for $k = 8$ and $m = 4$, where k and m indicate the number of integer and fraction bits in the representation, respectively.
 7. (15 marks) Let $A = 11001$, $B = 01100$, and $C = 10100$ be three 2's complement numbers in 5 bits. Perform 2's complement operations $A + B$ and $A + C$ to obtain the results. Verify to check whether or not there is an overflow. Provide a method and show how to obtain the correct result with your method if there is an overflow.