Last NAME: *First Name:*

Computer Science
C.Sc. 342

Quiz No.1

March 1, 2021

Please write your Last Name on every page:

NO CORRECTIONS ARE ALLOWED IN ANSWER CELLS!!!!!

You may use the back page for computations.

Please answer all questions. **Not all questions are of equal difficulty. Please review the entire quiz first and then budget your time carefully.**

Please hand write and sign statements affirming that you will not cheat:

"I will neither give nor receive unauthorized assistance on this exam. I will use only one computing device to perform this test"

Please hand write and sign here:

1. [10 points] For **each 8 BIT** binary pattern shown in the table below please write corresponding values of the following interpretations: **UNSIGNED INT, SIGNED INT, UNSIGNED Fixed Point, SIGNED Fixed Point.**

Each correctly answered column is **2.5** points. ***FIXED POINT IS LOCATED TWO POSITIONS FROM THE LEFT!***

MOST SIGNIFICANT BIT IS 7. LEAST SIGNIFICANT BIT IS 0.

76543210	**UNSIGNED INT**	**SIGNED INT**	**UNSIGNED Fixed Point**	**SIGNED Fixed Point**
10000000				
10000011				
10000001				
01000001				
01111111				
11111111				
11111100				
00000000				
01111110				
10001110				
00010011	19	+19	$4+\frac{3}{4}=\frac{16+3}{4}$	$+4+\frac{3}{4}=+\frac{19}{4}$

Fixed Point

2. [10 points] What is the most negative number (largest absolute value negative) that can be represented using 16 bit signed integer representation? Please circle around over all the correct ones: -32768, -65536, -16384, -32767, NONE

3. [10 points]Please subtract two number in Hex. Then convert each operand to binary and perform the same operation in binary, then repeat BASE 10. The signed integers are represented using two's complement.

0x0E		
-	-	-
0xFF		

Result: 0x 0000 0000b dec:

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4. [20 points]

Determine the **MINIMAL** number of **bit**s required to represent ***-127.75*** *using:*

4.1 (5 points) ASCII code [bits] *(please write the number of bits in the cell)*

4.2 (5 points) Binary Fixed Point representation [bits] *(please write the number of bits in the cell)*
And the corresponding binary Fixed Point representation here.

0	0	0	0	0	0	0	0	0	0		0	0						0

Fixed Point

4.3 (5 points) Take the result from you answer in 4.2 and shift fixed point by 2 positions to the RIGHT. Please write down the resulting signed decimal value,
And the corresponding binary Fixed Point representation here.

0	0		0	0	0	0	0	0	0	0		0	0						0

4.4**(5 points)** Please write down the signed rational number stored in the 9-bit word below:

1	0	0	0	0	0	0	0	1

Fixed Point

5. [10 points] Please determine if single precision floating point representation given below is ***NAN,or +Infinity,-Infinity, or a valid number*** floating point : The top row shows the bit index. ***PLEASE JUSTIFY your ANSWER and SHOW your*** work! Just the final result will not count as a correct answer.

31	30	29	28	27	26	35	24	23	22	21	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
0	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**1**	**1**	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**

6. [10 points] Please determine the decimal value (scientific notation) of the single precision floating point representation given below: The top row shows the bit index. ***PLEASE SHOW your*** work! Just the final result will not count as correct answer. ***If it represents NAN, or Infinity, or zero please state this and justify.***

31	30	29	28	27	26	35	24	23	22	21	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
1	**1**	**0**	**0**	**0**	**0**	**1**	**0**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**

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7. [5 points] Please determine the decimal value (scientific notation) of the single precision floating point representation given below: The top row shows the bit index. ***PLEASE SHOW your*** work! Just the final result will not count as correct answer. ***If it represents NAN, or Infinity, or zero please state this and justify.***

31	30	29	28	27	26	35	24	23	22	21	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
0	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**

8. [5 points] Please determine the decimal value (scientific notation) of the single precision floating point representation given below: The top row shows the bit index. ***PLEASE SHOW your*** work! Just the final result will not count as correct answer. If it represents NAN, or Infinity, or zero please state this and justify.

31	30	29	28	27	26	35	24	23	22	21	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
1	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**

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***In EACH Questions 10.1-10.4 you are given SIGNED Integers stored in 32 BIT Registers. (Not 33-BIT Register). Please write decimal, and binary operands and the results. For each question you have to write the result and* overflow or No overflow. You may override '0' with '1'.**

10.1 (5 points) What is the result (hexadecimal, decimal and binary) of the following addition:

```
  0x0000000E
+
  0xFFFFFFFF
```

HEX: 0x Decimal: Binary:0000 0000 0000 0000 0000 0000 0000 0000

10.2 (5 points) What is the result (hexadecimal, decimal and binary) of the following subtraction:

```
  0x7FFFFFFF
–
  0xFFFFFFFF
```

HEX: 0x0000000000 Decimal**:** Binary: 00000000000000000000000000000000

10.3 (5 points) What is the result(hexadecimal, decimal and binary) of the following subtraction:

```
  0x80000000
–
  0xFFFFFFFF
```

HEX: 0x Decimal: Binary: 00000000000000000000000000000000

10.4 (5 points) What is the result(hexadecimal, decimal and binary) of the following addition:

```
  0X7FFFFFFF
+
  0XFFFFFFFF
```

HEX: **0X** **Decimal:** **Binary**

Please write your result in the following form:

```
  0x80000000
+
  0xFFFFFFFF
```

OVEREFLOW

HEX: 0x7FFFFFFF Decimal:$+2^{31}-1$ Binary: **01111111111111111111111111111111**