CSC 256 – Machine Structures
Number Representations and Operations Quiz 1

Name:	Key
Student ID:	BLUE

Quiz 1 is going to test your knowledge on number representation and operations. This quiz is closed notes, internet, smart device, books, and other people. This class has limited space and you may be sitting closely next to someone. Pease refrain from looking at someone else's quiz. Doing so will result in **ZERO** for the quiz. The next time will result in being reported to the Department.

For each question ***MAKE SURE YOU PUT YOUR ANSWER IN THE PROVIDED BOX***. Failure to do so could result in losing point for that question. ***YOU HAVE BEEN WANRED!!!!***

If you have any questions, please raise your hand and I will come to you. If I cannot reach you, I may ask for you to just say it out loud.

Number Conversions

1. Convert **-2** to **8-bit** Two's Compliment binary

Answer:	11111110

0000 0010 → 1111 1101 + 1
1111 1110

2. Convert **2165** to unsigned **16-bit** hexadecimal

Answer:	0x875

2165/16 → 135 R 5
135/16 → 8 R 7
8/16 → 0 R 8
0x875 or 0x0875

3. Convert Two's Compliment binary **1010 1110** to decimal

Answer:	-82

Number is negative
1010 1110 → 0101 0001 + 1 → 0101 0010
2^6 + 2^4 + 2^1 → 64+16+2 = 82 → -82

4. Convert the unsigned **16-bit** hexadecimal value **0x4564** to decimal

Answer:	17764

0100 0101 0110 0100
2^2 + 2^5 + 2^6 + 2^8 + 2^10 + 2^14
4 + 32 + 64 + 256 + 1024 + 16384

5. Convert the Two's Compliment binary number to decimal, **0111 1011**

Answer:	123

Number is positive, convert as usual

2^0 + 2^1 + 2^3 + 2^4 + 2^5 + 2^6

1 + 2 +8+16+32+64 → 27+96 → 123

Number Operations Subtract and Addition

1. Add the unsigned binary numbers **0000 0001** and **1111 1111**.

Answer:	0000 0000

1	1	1	1	1	1	1	
1	1	1	1	1	1	1	1
0	0	0	0	0	0	0	1
0	0	0	0	0	0	0	0

2. Subtract the unsigned binary numbers **10101010** from **11111101**.

Answer:	01010011

						1 1	
1	1	1	1	1	+ 0	0	1
1	0	1	0	1	0	1	0
0	1	0	1	0	0	1	1

3. Add the two's complement binary numbers **1011 1001** and **1111 0000**.

Answer:	1010 1001

1	1	1					
1	0	1	1	1	0	0	1
1	1	1	1	0	0	0	0
1	0	1	0	1	0	0	1

4. Subtract the two's complement binary numbers **11111111** from **0111 1110.**

Answer:	0111 1111

1111 1111 → 0000 0000 + 1 → 0000 0001

0	1	1	1	1	1	1	0
0	0	0	0	0	0	0	1
0	1	1	1	1	1	1	1

5. Subtract the two's complement hexadecimal numbers **0x713F** from **0xC09E**.

0xFFFF-0x713F → 0x8EC0 + 1 → 0x8EC1

Answer:	0x4F5F

	1		
C	0	9	E
8	E	C	1
4	F	5	F

Extra Credit:

What are **two** advantages for using Two's compliment over One's complement to represent signed numbers in hardware? Please make sure your answer is concise. Listing a bunch of reasons will result in no points.

Answer:	No dirty 0 No need for hardware for add and subtract, one piece of hardware can do both