Name: Cindy Zhang   **CS115 HW3**   **Date:** October 10, 2019

I pledge my honor that I have abided by the Stevens Honor System.

1. **Convert the following numbers to decimal:**
   a. $0101\ 1001_2 = 89\ ((0)2^7 + (1)\ 2^6 + (0)2^5 + (1)2^4 + (1)2^3 + (0)2^2 + (0)2^1 + (1)\ 2^0)$
   b. $1011\ 1000_2 = -72\ ((1)\ (-128) + (0)\ 2^6 + (1)2^5 + (1)2^4 + (1)2^3 + (0)2^2 + (0)2^1 + (0)\ 2^0)$
   c. $1100\ 1001_2 = -55\ ((1)\ (-128) + (1)\ 2^6 + (0)2^5 + (0)2^4 + (1)2^3 + (0)2^2 + (0)2^1 + (1)\ 2^0)$

2. **Convert the following numbers to binary:**
   a. $103 = 0110\ 0111_2\ (64+32+4+2+1)$
   b. $-28 = 1110\ 0100_2\ (-128+64+32+4)$
   c. $-97 = 1001\ 1111_2\ (-128+16+8+4+2+1)$

3. **Using two's complement with 8 bits, what's the range of numbers that can be represented? Justify your answer.**
   a. The range is -128 to 127. We know that $1000\ 0000_2$ represents -128 the biggest negative binary and if you add any 1 after, you will receive numbers greater. Meanwhile if you have $0111\ 1111_2$ which is 127 you cannot put 1 in the first value because it's negative.

4. **Compute the following operations using binary numbers.** *Only answers with the binary arithmetic shown will receive credit.*

   a) 11 + 83

11	0	0	0	0	1	0	1	1
83	0	1	0	1	0	0	1	1
94	0	1	0	1	1	1	1	0

   b) 51 + 68

51	0	0	1	1	0	0	1	1
68	0	1	0	0	0	1	0	0
119	0	1	1	1	0	1	1	1

   c) 19 – 7

19	0	0	0	1	0	0	1	1
-7	1	1	1	1	1	0	0	1
12	0	0	0	0	1	1	0	0