1. For each of the following binary (base 2) numbers, **CONVERT IT TO DECIMAL** (base 10). Show your work where appropriate. You may assume that all of these numbers are non-negative.

(a) 00000001₂

(b) 00000011₂

(c) 00000110₂

(d) 00001101₂

(e) 01101101₂
2. For each of the following binary (base 2) numbers, **NEGATE** it (in two’s complement, using 8 bits). Show your work where appropriate.

(a) $00000001_2$

(b) $00000011_2$

(c) $00000110_2$

(d) $00001101_2$

(e) $01101101_2$
3. Convert the following decimal (base 10) numbers to binary (base 2). Show your work where appropriate.

(a) $1_{10}$

(b) $9_{10}$

(c) $14_{10}$

(d) $23_{10}$

(e) $31_{10}$
4. **CONVERT** the following numbers. Show your work where appropriate.

(a) $4653_7$ to base 10

(b) $23213_4$ to base 2 (**HINT:** Each digit in base 4 can be represented by a pair of digits in base 2; for example, the number $3_4$ is equal to $11_2$.)

(c) $2304_5$ to base 10

(d) $3756_8$ to base 2 (**HINT:** Each digit in base 8 can be represented by a set of 3 digits in base 2; for example, the number $6_8$ is equal to $110_2$.)

(e) $2201_3$ to base 8 (**HINT:** Convert to base 10 and then to base 8.)
5. **CALCULATE** the following sums. Show your work, including carries. The first exercise is in base 10; the rest are in base 2.

(a) \[62 + 49\]

(b) \[00111110 + 00100111\]

(c) \[01101011 + 11111010\]

(d) \[0000000011011011 + 1111111100100101\]
6. Consider this program:

```c
#include <stdio.h>
#include <stdlib.h>
#include <math.h>

int main ()
{
    const int minimum_power = 0;
    const int maximum_power = 7;
    const int minimum_value = 0;
    const int base = 2;
    const int program_failure_code = -1;
    const int program_success_code = 0;
    int maximum_value;
    int input_value;
    int current_value, power;

    maximum_value = (int) pow(base, maximum_power) - 1;
    printf("Input an integer between %d and %d inclusive:
          \n", minimum_value, maximum_value);
    scanf("%d", &input_value);
    if ((input_value < minimum_value) ||
        (input_value > maximum_value))
    {
        printf("That number is outside the range of %d to %d!
             \n", minimum_value, maximum_value);
        exit(program_failure_code);
    }
    for (power = maximum_power; power >= minimum_power; power--)
    {
        current_value = (int) pow(base, power);
        if (input_value < current_value)
        {
            printf("0");
        }
        else
        {
            printf("1");
            input_value -= current_value;
        }
    }
    printf("\n");
    return program_success_code;
} /* main */
```

Describe (in an general way) the output of this program, for any input integer between 0 and 127 (inclusive). If you aren’t confident of your answer, type in, compile and run the program to test it.
7. Give the ASCII code associated with each of the following characters.

(a) B

(b) R

(c) e

(d) h

(e) !

(f) blank space

(g) End of Text

(h) End of Transmission

8. In C, a character scalar literal constant can be expressed either as the character itself, or as a three digit number in which base?

9. In every character string, what character indicates the end of the string?

10. What ASCII value does that character have?

11. Which of these is the correct way to set the value of a string variable?

(a) destination_string =
    "This is the string contents that I want."

(b) strcpy(destination_string,
    "This is the string contents that I want."
12. Suppose that a character string named `my_name` has been declared and allocated at length 100. Write a statement that would set its contents to your name.

13. Suppose that a character string named `my_name` has been declared and allocated at length 100. Write a `printf` statement that outputs to `stdout` the string variable’s contents, followed by a newline.

14. Suppose you have two character string variables declared, allocated and filled with contents (some text). How would you tell whether the first string were less than, equal to or greater than the second string?

If you use **ANY** resources other than Dr. Neeman, the TAs (Borah, Mirza, Narasimhan, Sadri, Zhu), the course textbook or the materials posted on the course webpage, you **MUST** reference them on the quiz. **THIS INCLUDES CLASSMATES, FRIENDS, PROFESSORS, ONLINE RESOURCES, ETC.**