CS 1313 010 Fall 2024 Homework #15

Quiz to be held in class 9:00-9:15am Monday December 2 2024
NOTE: This is an OPTIONAL BONUS quiz: its value will affect your numerator in calculating your quiz grade but not your denominator.

NOTE: Except where and as explicitly permitted in writing (for example, in a Homework), you are ABSOLUTELY FORBIDDEN to COPY EVEN A SINGLE CHARACTER from, or to have ANY shared code with, ANY other entity, whether a human being (regardless of whether in CS1313 or not), a text resource, a computing resource or anything else, whether in person, on a local computer, online or anywhere else. It's INCREDIBLY EASY for us to detect such copying, so DON'T EVEN THINK ABOUT IT!

1. Give the ASCII code associated with each of the following characters.

   (a) D

   (b) W

   (c) m

   (d) r

   (e) ; [semicolon]

   (f) blank space

   (g) Carriage Return

   (h) Record Separator

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

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

4. What ASCII value does that character have?

5. 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.");
   ```

6. 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.

7. Suppose that a character string named `my_name` has been declared and allocated at length 100, and has been given contents (for example, your name as in the exercise just above). Write a `printf` statement that outputs to `stdout` the string variable's contents, followed by a newline.

8. 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?

9. Convert the following decimal (base 10) numbers to binary (base 2). Show your work where appropriate.

   (a) 2

   (b) 13

   (c) 25

   (d) 30

   (e) 63

10. 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

    (b) 00000011

    (c) 00000101

    (d) 00001101

    (e) 01010101

11. For each of the following binary (base 2) numbers, convert it to decimal (base 10), then give the character associated with that ASCII value. Show your work where appropriate.

    (a) 01000010

    (b) 01101110

    (c) 01011001

    (d) 01010001

    (e) 00011111

12. **CONVERT** the following numbers. Show your work where appropriate.

(a) 6435_7 to base 10

(b) 32302_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) 4013_5 to base 10

(d) 6435_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) 1022_3 to base 8 (**HINT:** Convert to base 10 and then to base 8.)

13. **CALCULATE** the following sums. Show your work, including carries. The first exercise is in base 10; the rest are in base 2.

(a)
$$\begin{array}{rr} & 30 \\ + & 47 \\ \hline \end{array}$$

(b)
$$\begin{array}{rr} & 00100111 \\ + & 00111110 \\ \hline \end{array}$$

(c)
$$\begin{array}{rr} & 01010100 \\ + & 11111101 \\ \hline \end{array}$$

(d)
$$\begin{array}{rr} & 0000000010100100 \\ + & 1111111100011010 \\ \hline \end{array}$$

14. Consider this program:

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

int main ()
{ /* 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, 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);
    } /* if ((input_value < minimum_value) || ...) */
    for (power = maximum_power; power >= minimum_power; power--) {
        current_value = (int)pow(base, power);
        if (input_value < current_value) {
            printf("0");
        } /* if (input_value < current_value) */
        else {
            printf("1");
            input_value -= current_value;
        } /* if (input_value < current_value)...else */
    } /* for power */
    printf("\n");
    return program_success_code;
} /* main */
```

Describe (in a 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.

If you use **ANY** resources other than Dr. Neeman, the TAs/graders (Basiri, Bilal), 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.**