Assignment 1

Individual/independent
Due Date: FEB 26, 2023
Assignment 1: **15** points of total mark

Assignment 1 consist of two sections:
    PART1: Answering questions [50%]
    PART2: Coding [50%]

    For the coding section, you may work with TAs. Please consider that TAs will assist with any problems and errors; TA will not be assistant on answering the solutions.

How submit your solution for assignment 1:
PART1:

- For the first part submit solution as a single PDF file and upload it on mycourselink.
- Solutions MUST be typed; no other format will be accepted.
- Save your file as per the following example of naming pattern:
  Name_FamilyName_StudentID_PART1.pdf

PART2:

- For the second part submit the solution as a single PDF file and upload it on mycourselink.
- Solutions MUST be typed; no other format will be accepted.
- Sections that asked to analyze the code just add your explanation in your solution file.
- Section that requires writing a code take screenshots of the outputs and add them to your solution file.
- Save your solution file as per the following example of naming pattern:
  Name_FamilyName_StudentID_PART2.pdf
- Upload the source code of each program with the following pattern:
  Name_FamilyName_StudentID_PROGRAMX.c
  Ex: AMIN_SAFAEI_123456_PROGRAM1.

Assignment 1 - PART1

1. What is the hexadecimal representation of each of the following binary numbers? **(3 points)**

   ```
   a. 0011 0101 1101 1010
   b. 1100 1110 1010 0011
   c. 1111 1110 1101 1011
   ```

2. What is the binary representation of the following hexadecimal numbers? **(3 points)**

   ```
   a. 0126F9D4
   b. 6ACDFA95
   c. F69BDC2A
   ```

3. What is the 16-bit hexadecimal representation of each of the following signed decimal integers? **(4 points)**

   ```
   a. -24
   b. -331
   c. -21
   d. -45
   ```

4. The following 16-bit hexadecimal numbers represent signed integers. Convert each to decimal. **(4 points)**

   ```
   a. 6BF9
   b. C123
   c. 4CD2
   d. 8230
   ```

5. What is the 8-bit binary (two's-complement) representation of each of the following signed decimal integers? **(6 points)**

   ```
   a. -5
   b. -42
   c. -16
   d. -72
   e. -98
   f. -26
   ```

6. What is the sum of each pair of hexadecimal integers? **(4 points)**

```
a. 6B4 + 3FE
b. A49 + 6BD
c. 7C4 + 3BE
d. B69 + 7AD
```

7. Create a truth table to show all possible inputs and outputs for the Boolean functions: **(6 points)**

```
a. ¬ (A ∨ B)
b. ¬ A ^ ¬ B
```

8. Declare an array of 120 uninitialized unsigned doubleword values **(5 points)**

9. Declare an array of byte and initialize it to the first 5 letters of the alphabet. **(5 Points)**

10. Declare an unsigned 16-bit integer variable named **wArray** that uses three initializers. **(5 points)**

11. Declare an array of 20 unsigned bytes named **bArray** and initialize all elements to zero. **(5 points)**

12. Which data directive creates a 32-bit signed integer variable? **(7.5 points)**

13. Which data directive creates a 16-bit signed integer variable? **(7.5 points)**

14. Which data directive creates a 64-bit unsigned integer variable? **(7.5 points)**

15. Which data directive creates an 8-bit signed integer variable? **(7.5 points)**

16. Which data directive creates a 10-byte packed BCD variable? **(5 points)**

17. Which directive ends a procedure? **(5 points)**

18. Show the order of individual bytes in memory (lowest to highest) for the following double-word variable: **(10 points)**

```
val1 DWORD 87654321h
```

Assignment 1 – PART2

Use C programming language you wish for the following programming exercises. Do not call built-in library functions that accomplish these tasks automatically. (Examples are sprintf and sscanf from the Standard C library.)

1. Write a function that receives a string containing a 16-bit binary integer. The function must return the string's integer value. **(10 points)**

2. Write a function that receives a string containing a 32-bit hexadecimal integer. The function must return the string's integer value. **(10 points)**

3. Write a function that receives an integer. The function must return a string containing the binary representation of the integer. **(20 points)**

4. Write a function that receives an integer. The function must return a string containing the hexadecimal representation of the integer. **(20 points)**

5. Write a function that adds two digit strings in base b, where Each string may contain as many as 1,000 digits. Return the sum in a string that uses the same number base. **(20 points)**

6. Write a function that adds two hexadecimal strings, each as long as 1,000 digits. Return a hexadecimal string that represents the sum of the inputs. **(20 points)**