ENGG*1410 “Introductory Programming for Engineers”, Assignment #1

C Concepts / Program Structure / Data types / Input-Output

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General questions

1. Related to problem solving in general:

   - What are the steps required for solving any programming problem?
   - What are the programming tools used by a programmer to convert algorithms into computer programs?
   - What is the difference between a flowchart and Pseudo-code?

2. Related to programming languages in general:

   - What is the difference between (a) Source Code, (b) Object Code, (c) Executable code?
   - What are the most important statement structures in any programming language?
   - How do you classify Computer Languages used?
   - What are the advantages of a High Level Language over Assembly Language?

3. Related to the C Language:

   - When was the C language created?
   - What was the C language originally developed to create?
   - Why should programmers learn the C language?
   - What is the difference between the compiler and pre-processor in the C Language?
   - What is the line #include <stdio.h> at the top of a C source file for?
   - What are some uses for comments?
   - What is the function of the semicolon in a C statement?

4. Get the “Hello, world!” program to work on your computer. Indicate the steps you took to go from writing the source code to compiling to running that program.
5. Below is a sample program that will not compile. Why not? By moving which line can we get the code to compile?

```
1
2   int main()
3   {
4   printf("Hello World\n  ");
5   return EXIT_SUCCESS;
6   }
7
8   #include <stdio.h>
```

6. Below is a sample program. Use it to answer the following question: What happens if we declare the same name twice within a block, giving it two different meanings?
   Did your program compile? If so, what does it print? If not, what error message Do you get?

```c
#include <stdio.h>

int main()
{
    int arg1;
    arg1 = -1;
    int x, y, z;
    char myDouble = '5';
    char arg1 = 'A';
    printf("%d\n", arg1);
    return 0;
}
```

Syntacs / Declaration

7. What is the purpose of the #include <stdio.h> at the beginning of most C programs?
8. Explain, briefly, the difference between the data types
   a. long int, short int and int.
   b. double and float.
9. What do we mean by the term reserved word?
10. Assume that you want to define a variable to store the number of students in a class. What type of variable would you need to define? Show how you would define such a variable.
11. Write a program that prints the following text.

- In C, lowercase letters are significant
- main( ) is where program execution begins
- main( ) is different than Main ( ) , the latter actually will not serve the purpose
- All C program statements must be terminated by a semicolon

12. Determine which of the following variable declarations are valid. For the invalid declarations, indicate why they are invalid.

    - int cvg1234;
    - float double;
    - char 1letter;
    - long hello$world;
    - int x_Y_4;

13. Indicate which of the following are illegal names for a variable identifier stating the reason in each case

    - Double
    - Main
    - 3Cats
    - he_llo
    - num 4
    - E2E

Input / output

14. Write a program what output the message
    To C or Not to C
    That is the question!

15. Show how you would print the following menus on the screen using a single printf statement

    a- Start Game
    b- Load Game
    c- Save Game
    d- Exit
    Please enter your choice:

16. Write a program that subtracts the value 14 from 87 and displays the result, together with an appropriate message, at the terminal.
17. Identify the syntactic errors in the following program. Then type in and run the corrected program to ensure you have correctly identified all the mistakes.

```
1
2  int main(Void)
3  {
4    INT sum;
5    /* Compt Result
6    sum = 25 + 37 -1
7
8    /* Display Results //
9    printf("The answer is %i \n"     sum);
10
11   return 0;
12 }
```

18. Write a program that reads two integers and print their sum to the screen.

19. Write a program to print the numbers from 1 to 10 and their squares:

```
1               1
2               4
3               9
4               16
...             ....
10              100
```

Later we will write this program in a much "automated" processed and generic way rather than using a "dumb" printf statement.

20. Assume that you want to define a variable to store the number of students in a class. What type of variable would you need to define? Show how you would define such a variable.

21. Write a C program that reads the radius of a circle and calculates and displays
The area of a circle. The circumferences of the circle.

22. Write a C program that reads the length and width of a rectangle and calculates and displays the area and perimeter of the rectangle
23. Write a C program that reads a distance in meters and converts it to centimeters and millimeters. The program should display the results on the screen.

24. Write a program that gives the following outputs

a-

```
**********
*  CoE   *
**********
```

b-

```
************
************
**   CoE   **
************
************
```