IT110 Lab Assignment 1

Objective: by the end of this lab session, you should have reasonable understanding of the following:

I. Basic structure of the C program
II. printf and scanf statements and the format specifiers such as %d, %c and %f
III. Conversion of arithmetic expressions involving basic operators: +, -, /, *, %, = into C statements
IV. Precedence/priority of operators in C expressions
V. Associativity of the operators in C expressions
VI. Automatic type conversion: promotion (example: int to float) and demotion (example: float to int)
VII. Escape sequences such as \n, \t, \v, \, \r, and "

Note:

i. Every program that you write should have an accompanying comment specifying what the program does.
ii. Before implementing a program, create a flowchart for that program in your notebook.
iii. Indent your code for better readability.
iv. Give meaningful names to the variables and functions.

1. Write a program to print the following:
   a. Hello World!
   b. your name followed by your age on the next line.
   c. I love programming in “C”
   d. Path of the file in Windows is C:\User\Hello.c
   e. This sentence has a lot of space in it.
   f. Level 1

   Level 0

   g. letters ‘L’, ‘F’, ‘A’ and ‘X’ using stars (or asterisks or *)
   h. Print 45.123456 upto 2 decimal places
   i. Print 5 numbers in the range of 0-100, separated by comma, using a single printf statement.
      Example: 5, 10, 17, 9, 100
2. Write a program to take the following input from the user
   a. Age of the user (Example: 26)
   b. A character: y or n (Example: y)
   c. Temperature: (Example: 40.92)

   Example code fragment:
   ```c
   void main()
   {
       int age;
       printf("Enter your age");
       scanf("%d", &age);
       printf("The age is %d", age);
   }
   ```

3. Print and compare the output of the following statements in both columns
   when variable ‘a’ is of type int and of type float, respectively. Note the
   difference in the output due to automatic type conversion. The value of the
   expression is promoted or demoted depending on the type of the variable on
   left-hand side of =.

<table>
<thead>
<tr>
<th>int a;</th>
<th>float a;</th>
</tr>
</thead>
<tbody>
<tr>
<td>a = 3 + 5;</td>
<td>a = 3 + 5;</td>
</tr>
<tr>
<td>a = 3 + 5.8;</td>
<td>a = 3 + 5.8;</td>
</tr>
<tr>
<td>a = 32768+1</td>
<td>a = 32768+1</td>
</tr>
<tr>
<td>a = 2/9;</td>
<td>a = 2/9;</td>
</tr>
<tr>
<td>a = 2/9.0;</td>
<td>a = 2/9.0;</td>
</tr>
<tr>
<td>a = 9/2;</td>
<td>a = 9/2;</td>
</tr>
<tr>
<td>a = 9.0/2;</td>
<td>a = 9.0/2;</td>
</tr>
</tbody>
</table>

4. First evaluate the expression on paper and then compare the output with your
   expectation. (Observe the hierarchy of operations and the associativity of the
   operators having equal precedence)

<table>
<thead>
<tr>
<th>Expression</th>
<th>Expected output</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>g = big / 2 + big * 4 / big - big + abc / 3 ;</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(abc = 2.5, big = 2, assume g to be a float)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
on = ink * act / 2 + 3 / 2 * act + 2 + tig;
(ink = 4, act = 1, tig = 3.2, assume on to be an int)

s = qui * add / 4 - 6 / 2 + 2 / 3 * 6 / god;
(qui = 4, add = 2, god = 2, assume s to be an int)

s = 1 / 3 * a / 4 - 6 / 2 + 2 / 3 * 6 / g;
(a = 4, g = 3, assume s to be an int)

5. Evaluate the expression by writing C statements
   a. $3x^2 + 2x + 5$
   b. $\frac{a+b+c}{d+e}$
   c. $\frac{2By}{d+1} - \frac{x}{3(z+y)}$
   d. $R = \frac{2v+6.22(c+d)}{g+v}$

6. Write a program to take two integer values as input from the user and print their sum and difference.
   Input: two integer numbers x and y using scanf statement
   Output: x + y and x - y
   Example: Input 3 and 4, output is 7 and -1

7. In a company, an employee is paid as under: along with the basic salary, the employee would be given dearness allowance of 40% of his basic salary and house rent allowance of 20% of his basic salary. If the basic salary of an employee is received as an input, write a program to find his/her gross salary.
   Input: basic salary,
   Output: gross salary,
   Example: Input: 1200, output: 1920
8. The distance between two cities (in km) would be given by the user. Write a program to convert and print this distance in:
   a. Meters
   b. Feet
   c. Inches
   d. Centimeters

   Input: distance in km
   Output: distance in each of the mentioned units,
   Example: Input: 50,
   output: In feet: 164042.000000,
           In meters: 50000.000000,
           In inches: 1968505.000000,
           In centimeters: 5000000.000000
(1 km = 3280.84 feet, 1 km = 39370.079 inches)

9. A student enters his/her marks of 5 subjects in a program. Assume the maximum marks that can be obtained by a student in each subject to be 100. Write a program to calculate the percentage marks obtained by the student.
   Input: marks of 5 subjects separated by spaces.
   Output: aggregate marks on the first line, percentage on the second line
   Example: Input: 70 76 88 68 90, Output: Total: 392, Percentage: 78.40%

10. The user will enter a four digit number, Write a program that calculates the sum of its digits. (Hint: use the modulus operator ‘%’).
    Input: 4-digit number, output: sum of four digits
    Example: 1234, output: 10

11. Suppose a five digit number is input by the user. Write a program to print a new number by adding one to each of its digits. For example if the number entered by the user is 12391 then the output should be 23402.
    Input: 5-digit number, Output: Number with each digit incremented by one

12. Suppose a user enters the total selling price of 15 items and the profit earned on the total. Write a program to find the total cost price of the items.
13. Write a program to take a 5-digit number as input from the user and display the reverse of the number. (Example: 12345 should be displayed as 54321)

14. Paper of size A0 has dimensions 1189 mm and 841 mm. Each subsequent size A(n) is defined as A(n-1) cut in half parallel to its shorter sides. Thus, paper of size A1 would have dimensions 841 mm x 594 mm. Write a program to calculate and print paper sizes A0 through A8.