Assignment 1 (Intro – Operator)

Submission guideline:

1. SOLVE ALL 32 Problems
2. You have to write each program in separate c file. Suppose your student ID – 0112019344.
   Then the name of your files will be –
   0112019344_1.c // for problem 1
   0112019344_2.c // for problem 2
   0112019344_3.c // for problem 3
   0112019344_4.c // for problem 4
   0112019344_5.c // for problem 5
   0112019344_6.c // for problem 6
3. Then put all the c files(**only .c files not .exe or .o**) in one folder and rename the folder with your "student ID_Assignment01_Trimester" (if you are in Spring write Spring in the place of Trimester, if you are in Fall, write Fall in the place) and
4. Zip the folder and finally submit the 0112019344_Assignment01_Trimester.zip file.
5. Submission deadline : **Follow the deadline mention in LMS.**

6. Please do not copy codes from others or directly from the internet. Each of the assignments will be evaluated with a viva. You must be able to explain your code. Also, we will run a copy checker on the submissions. Any plagiarism will be severely penalized.

(15 questions - Intro)

<table>
<tr><th>SL</th><th>Problem statement</th><th>Difficulty levels</th></tr>
<tr><td>1.</td><td>Program that will print “Hello World”.

<table><tr><th>Sample input</th><th>Sample output</th></tr><tr><td></td><td>Hello World</td></tr></table></td><td>*</td></tr>
<tr><td>2.</td><td>Program that will use newline/tab and print the following segment:

<table><tr><th>Sample input</th><th>Sample output</th></tr><tr><td></td><td>Hello World.
This is my first program. C is fun.</td></tr></table></td><td>*</td></tr>
<tr><td>3.</td><td>Program that will print the following segment:

<table><tr><th>Sample input</th><th>Sample output</th></tr><tr><td></td><td>The question is - “How to write a
\comment/ in C programming language?”</td></tr></table></td><td>*</td></tr>
<tr><td>4.</td><td>Program that will declare an integer, a floating point number, a character. Then it will initialize them with values and print those values.

<table><tr><th>Sample input</th><th>Sample output</th></tr><tr><td></td><td>The integer value: 5
The floating point value: 3.141593
The character value: a</td></tr><tr><td></td><td>The integer value: 100
The floating point value: 1.618000
The character value: z</td></tr></table></td><td>*</td></tr>
<tr><td>5.</td><td>Program that will do the followings:
a) Declare a variable uninitialized
b) Declare and initialize a variable in one statement
c) Declare and initialize multiple variables with different values in one statement
d) Declare and initialize multiple variables with the same value in one statement</td><td>*</td></tr>
</table>

6. Program that will take your age in year(s) as input and print it. *

Sample input	Sample output
20	My age is: 20
21	My age is: 21

7. Program that will receive the values of an integer, a floating point number, a character from the keyboard and print those values. *

Sample input	Sample output
5 3.141593 A	The integer value: 5 The floating point value: 3.141593 The character value: a
100 1.618 z	The integer value: 100 The floating point value: 1.618000 The character value: z

8. Program that will take three integer numbers from keyboard but assign only the first and last inputs to variables and skip any assignment of the middle one. **

Sample input	Sample output
20 50 100	First Value = 20, Last Value = 100
33 75 22	First Value = 33, Last Value = 22

9. Program that will declare a variable from each data type: double, boolean. Then it will initialize them with values and print them. *

Sample input	Sample output
	The double value: 3.140000e+00 The boolean value: 1
	The double value: 1.618039 The boolean value: 0

10. Program that will declare a variable from each data type: long int**,** long long int**,** long double, short int. Then it will initialize them with values and print them. **

Sample input	Sample output
	The long int value: 2147483647 The long long int value: 9223372036854775807 The long double value: 1.1E+4932 The short int value: 32767

		The long int value: -2,147,483,648 The long long int value: -9223372036854775808 The long double value: 3.4E-4932 The short int value: -32768	
11.	Program that will declare a variable from each data type: unsigned int, unsigned long int, unsigned long long int, unsigned short int. Then it will initialize them with values and print them.		**
	Sample input	**Sample output**	
		The unsigned int value: 4294967295 The unsigned long int value: 4294967295 The unsigned long long int value: 18446744073709551615 he unsigned short int value: 65,535	
		The unsigned int value: 0 The unsigned long int value: 0 The unsigned long long int value: 0 The unsigned short int value: 0	
12.	Program that will define a constant using "CONST" and print the value.		**
	Sample input	**Sample output**	
		The value of pi: 3.14	
		The value of golden ratio: 1.62	
13.	Program that will define a constant using "DEFINE" and print the value.		**
	Sample input	**Sample output**	
		The value of HEIGHT: 200	
		The value of PI: 3.14	
14.	Program that will define a global and a local variable with the same name but with different values, and then do the following steps in order- A. Print the value of the variable before defining the local variable B. Print the value of the variable after defining the local variable C. Explicitly print the value of the variable as global		**
	Sample input	**Sample output**	
		A. Global: 10 B. Local: 20 C. Global: 10	

15.	Program that will take an floating point number as input from the keyboard and use *printf* function to perform the followings: (a) Print the number right justified within 10 columns (b) Print the number to be right justified to 2 columns (Assuming the input has more than 2 digits) (c) Print the number rounded to two decimal places (d) Print the number rounded to integer (without using conversion or type casting) (e) Prints the number in exponential notation/scientific notation **Sample input** | **Sample output** 123.098 | (a) Val: 123.098000 (b) Val:123.098000 (c) Val:123.10 (d) Val:123 (e) Val: 1.230980e+02	**

Operator Related Problems

(Total 16 questions)

<table>
<tr><th>SL</th><th>Problem statement</th><th>Difficulty levels</th></tr>
<tr><td>16</td><td>Program that will take two numbers X and Y as inputs, then calculate and print the values of their addition, subtraction, multiplication, division (quotient and reminder).

<table>
<tr><th>Sample input (X,Y)</th><th>Sample output</th></tr>
<tr><td>5 10</td><td>Addition: 15
Subtraction: -5
Multiplication: 50
Quotient : 0
Reminder: 5</td></tr>
<tr><td>-5 10.5</td><td>Addition: 5.5
Subtraction: -15.5
Multiplication: -52.5
Quotient: 0
Reminder: -48</td></tr>
</table>
-14 % 3 = -2

-14 % -3 = -2</td><td>*</td></tr>
<tr><td>17.</td><td>Program that will calculate the circumference of a circle having radius r.
Area, A = 2 * Pi * r

<table>
<tr><th>Sample input (r)</th><th>Sample output</th></tr>
<tr><td>5</td><td>Area: 31.4</td></tr>
<tr><td>10.5</td><td>Area: 65.94</td></tr>
</table></td><td>*</td></tr>
<tr><td>18.</td><td>Program that will take two numbers (a, b) as inputs and compute the value of the equation – (Without using math.h)
$X = (3.31 * a^2 + 2.01 * b^3) / (7.16 * b^2 + 2.01 * a^3)$

<table>
<tr><th>Sample input (a, b)</th><th>Sample output</th></tr>
<tr><td>5 10.5</td><td>X = 2.315475</td></tr>
<tr><td>100 -250</td><td>X = -12.766287</td></tr>
</table></td><td>*</td></tr>
</table>

19. Program that will increment and decrement a number **X** by 1 inside the *printf* function. (Use ++ and - - operators) **

Sample input(X)	Sample output
5	X++ : 5 ++X : 6 X- - : 6 --X : 5
-5	X++ : -5 ++X : -4 X- - : -4 --X : -5

20. Program that will increment and decrement a number **X** by **Y**. (Use += and -= operators) *

Sample input(X,Y)	Sample output
5 10	Incremented Value: 15 Decremented Value: -5
-5 5	Incremented Value: 0 Decremented Value: -10

21. Program that will multiply and divide a number **X** by **Y**. (Use *= and /= operators) *

Sample input(X,Y)	Sample output
56 10	Multiplication: 560 Division: 5
-56 -10	Multiplication: 560 Division: 5

22. Program that will declare and initialize an integer and a floating point number. Then it will perform floating to integer and integer to floating conversions using **

(a) Assignment operation
(b) Type casting

Sample input	Sample output
-150 123.125	Assignment: 123.125000 assigned to an int produces 123 Assignment: -150 assigned to a float produces -150.000000 Type Casting: (float) -150 produces -150.000000 Type Casting: (int) 123.125 produces -123

23. Program that will take two numbers as inputs and print the maximum value. (Using conditional operator - ?) **

Sample input (x, y)	Sample output
20 100	Max: 100
50 -20	Max: 50

24. Program that will evaluate the following equations - *

X = a – b / 3 + c * 2 – 1
Y = a – (b / (3 + c) * 2) - 1
Z = a – ((b / 3) + c * 2) - 1

Sample input (a, b, c)	Sample output
9 12 3	X = 10 Y = 4 Z = -2

25. Program that will take **a**, **b** & **c** as inputs and decide if the statements are True (1) of False (0) **

a) $(a + b) \leq 80$
b) $!\,(a + c)$
c) $a! = 0$

Sample input (a, b, c)	Sample output
10 -10 0	a) 1 b) 0 c) 1

26. Program that will take **a**, **b** & **c** as inputs and decide if the statements are True (1) of False (0) **

1) $(a + b) \leq 80 \;\&\&\; b \geq 0$
2) $(a - b) == 0 \;||c! = 0$
3) $a! = b \;||(b < a)\&\&c > 0$

Sample input (a, b, c)	Sample output
10 -10 0	1) 0 2) 0 3) 1

27. Program that will take calculate the roots of a quadratic equation ($a.x^2 + b.x + c = 0$) from the formula, (here, dot (.) stands for multiplication) - ******

$$\mathbf{root} = \frac{-\mathbf{b} \pm \mathbf{sqrt}(\mathbf{b^2} - 4.\mathbf{a}.\mathbf{c})}{2.\mathbf{a}}$$

Sample input (a, b, c)	Sample output
2 4 -16	2.00 -4.00
1 2 3	Imaginary

28. Program that will evaluate the equation ******

$$2\cos^2 x - \sqrt{3}\sin x + \sin\frac{x}{2}$$

; where 1<= x <=180 [No checking needed]

Sample input (x)	Sample output
30	2.409196
120	0.015323
180	2.997943

29. Program that will take a floating point number **X** as input and evaluate **A,B,C** where- ******

A = Value when **X** is rounded up to the nearest integer

B = Value when **X** is rounded down to the nearest integer

C = Absolute value of **X**

Sample input(X)	Sample output
10.6	A = 11, B = 10, C = 10.6
-77.9	A = -77, B = -78, C = 77.90

30. Program to find size of int, float, double and char of the system. ******

Sample input	Sample output
	Size of int in byte(s) = 4 Size of float in byte(s) = 4 Size of double in byte(s) = 8 Size of char in byte(s) = 1

31.	Write a program that will take number of days as input and print it in year-month-day format.(considering all months have 30 days, 1 year = 30 *12 = 360) **Sample input** — **Sample output** 400 — 1 years 1 months 10 days 1423 — 3 years 11 months 13 days	**

32.	Write a program that calculates the price of Oil to be purchased by the customer. It takes input of purchased amount of oil, today's rate/liter and discount rate. Then, Vat (20%) and the entered discount to be given to the customer. Final price should also be "floored" to the nearest hundredth value. Also, two tk per purchase to be donated.	**