

# Programming Fundamentals: Lab-01

(BS-CS-F21 Morning)

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## Instructions

1. Read the whole document carefully.
2. You must complete all tasks individually. Absolutely NO collaboration is allowed. Any traces of plagiarism/cheating would result in heavy penalty.
3. Don't hesitate to ask any questions.

## Task#1

You are given a number, let's call it num. Now check if this number (num) is either positive, negative or zero. Also print that number in a presentable fashion.

## Task#2

You are given a number, let's call it num. Now check if this number(num) is either even or odd. Also print result in a presentable way. (Hint: In programming we use Modulo Operator (%) to find the remainder of an integer division.)

## Task#3

You are given two numbers as num1 and num2. Find their remainder and display result on the screen.

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### Task#4

You are given a temperature value in **Fahrenheit**, let's call it F. Now convert this temperature from **Fahrenheit to Celsius**. You should print the result.

(Hint: Fahrenheit to Celsius:  $\frac{5}{9}(F^\circ - 32) + 32$ )

### Task#5

You are given a temperature value in **Celsius**, let's call it C. Now convert this temperature from **Celsius to Fahrenheit**. You should print the result.

(Hint: Celsius to Fahrenheit:  $\left( \frac{9}{5}C^\circ + 32 \right)$ )

### Task#6

Suppose you are given three numbers A, B and C. Find the largest number among these three and properly print/display the greatest number.

### Task#7

You are given three sides of a triangle, let's call them side1, side2, side3. Check whether the triangle is equilateral, scalene, or isosceles.

### Task#8

You are given numbers for four courses (database, algo, oop, dsa) as numDatabase, numAlgo, numOOP and numDSA. Now calculate total marks, average marks and percentage marks. Properly display all of them.

### Task#9

You are given a number, let's call it num. Now check if this number (num) is completely divisible by both 55 and 71. If not, then simply display NOT COMPLETELY DIVISIBLE on the screen.

## Task#10

You are given a character ch. Now check whether the character is vowel or consonant or none. Properly use print statements to show the output.

## Task#11

You are given three angles of a triangle, let's call them angle1, angle2, angle3. Check whether the triangle is valid or not.

(Hint: A valid triangle meets these conditions if angles are given: sum of all three angles equate 180 and neither of the angle is zero).

## Task#12

You are given three sides of a triangle, let's call them side1, side2, side3. Check whether the triangle is valid or not.

(Hint: Sum of any two sides must be greater than third side for a valid triangle.)

## Task#13

You are given a side of an equilateral triangle as side1. Now calculate area of that triangle and display it on the screen.

(Hint: Area =  $\frac{\sqrt{3}}{4} side^2$  )

## Task#14

You are given a number as (numDays) representing the days. Now show how many years and weeks are there for these days.

## Task#15

Main objective of this task is to find name of week day when you are given the day number (dayNum) of that week. Suppose you are given value of dayNum as 1, your program should display Week day is "Monday", if value given is 5, your program

HAPPY CODING 😊

should display Week day is "Friday". You program should handle all the week days ranging from (1-7)

### **Task#16**

Congratulations! You are hired as a software developer at a tech company. Your first task is to write a program to find either your company is in Profit or Loss or none.

You are given two values; selling price as (sellingPrice) and cost price as (costPrice). Use proper print statement to show profit value if company is in profit otherwise show loss value if company is in loss.

Hint:

- Profit = sellingPrice - costPrice
- Loss = costPrice – sellingPrice

--- END OF LAB ---

*"Experience is the name everyone gives to their mistakes." – Oscar Wilde*

## LAB QUIZ 01

Monday 29<sup>th</sup> August, 2022

Max. Marks: 30

Time Allowed: 40 minutes**Instructions:**

- 1) Always start with the name of Allah Almighty, most beneficial and most merciful.
- 2) You are not allowed to take any help from anyone during quiz.
- 3) Use of mobile and internet is strictly not allowed.
- 4) Use of calculator is not allowed.
- 5) Store your files with following naming conventions:

LabQuiz\_<Lab quiz number>\_<student ID>\_T\_<Task ID>.<extension>  
e.g. for today's quiz, file names for student BCSF21M001 will be like following:  
a) LabQuiz\_01\_BCSF21M001\_T\_01.larp  
b) LabQuiz\_01\_BCSF21M001\_T\_02.larp  
c) LabQuiz\_01\_BCSF21M001\_T\_03.larp

- 6) Do not open your quiz until "Start Your Quiz" is announced by the teacher/TA.
- 7) Do not write ANYTHING after announcement of "STOP WRITING".
- 8) Understanding question is part of examination, so during quiz no query will be entertained.

In case of any negligence/violation about instructions, your quiz will be graded with zero/negative marks.

**For Invigilator Use Only:**

Instruction No. Violated: \_\_\_\_\_

Details if Any: \_\_\_\_\_

Penalty: \_\_\_\_\_

Name: \_\_\_\_\_

Signature: \_\_\_\_\_

Task ID	Task 1	Task 2	Task 3	Total
Max. Marks:	10	10	10	30
Obt. Marks:				

Final Marks after deduction of penalty: \_\_\_\_\_

Name: \_\_\_\_\_

Marked by: \_\_\_\_\_

### **TASK 1:**

A library charges its members if a book is not returned on/before expected date of return. Draw a flow chart using LARP that accepts the number of days passed after return\_date from the user. Calculate the charges of the library according to the following.

Till five days: Rs 2/day.

Six to ten days: Rs 3/day.

11 to 15 days: Rs 4/day.

More than 10 days: Rs 15/day.

Calculate and print the total charges.

### **TASK 2:**

Write a pseudo code using LARP that calculates and displays a person's body mass index (BMI). The BMI is often used to determine whether a person is overweight or underweight for his or her height. A person's BMI is calculated with the following formula:

$$\text{BMI} = \text{weight} * \frac{703}{\text{height}^2}$$

where weight is measured in pounds and height is measured in inches. The program should display a message indicating whether a person has optimal weight, is underweight, or is overweight. A person's weight is considered to be optimal if his or her BMI is between 18.5 and 25. If the BMI is less than 18.5, the person is considered to be underweight. If the BMI is greater than 25, the person is considered to be overweight.

### **TASK 3:**

Display first n terms of odd natural numbers and their sum. Input n from user. Draw a flow chart of your solution using LARP.

#### **SAMPLE INPUT:**

Given term: 10

#### **SAMPLE OUTPUT:**

Number of odd natural numbers: 1 3 5 7 9 11 13 15 17 19

Sum of odd natural numbers: 100

3 2 1

3 1 2

2 1 3

2 3 1

1 2 3

1 3 2

3 2 1

2 3 1

1 3 2

(31, 3, 2, 1)  
num<sup>2</sup>, num<sup>1</sup>, num<sup>3</sup>

# Programming Fundamentals: Lab-02

BS-CS-F21 Morning

Spring 2022 Semester

Monday 29<sup>th</sup> of August, 2022

Instructor: Dr. Saadia Shahzad

## Instructions:

- 1) Always start with the name of Allah Almighty, most beneficial and most merciful.
- 2) Read the document carefully before start.
- 3) Don't hesitate to ask any questions from teacher and TAs but not from your fellows.
- 4) Use of mobile and internet is strictly not allowed.
- 5) Store your files with following naming conventions:

LabWork\_<Lab No.>\_<student ID>\_T\_<Task ID>.<extension>

e.g. for today's lab, file names for student BCSF21M001 will be like following:

- a) LabWork\_02\_BCSF21M001\_T\_01.larp
- b) LabWork\_02\_BCSF21M001\_T\_02.c etc.
- 6) At the end, compress your files in a .zip or .rar file with name like: LabWork\_02\_BCSF21M001.zip.  
If you are not familiar with this, you can ask TAs.
- 7) Lab work will be submitted at the end of every lab on LAN in a given folder name.

In case of any negligence/violation about instructions, your lab work will be graded with zero/negative marks.

## Instructions for writing C programs offline.

- 1) Click to open Windows Start Menu.
- 2) Type "Visual"
- 3) Select Visual Studio Command Prompt from list.
- 4) Move to your required directory using basic dir, md or cd commands.
- 5) Create/open a new file using Notepad file1.c
- 6) Write your first C program, save and exit notepad.
- 7) On command prompt, write:

cl file1.c

- 8) If there will be any errors, read them and edit/correct your code again using notepad.
- 9) When compiled successfully, an executable file named file1.exe will be created.
- 10) On command prompt, write:

file1

or write file1.exe

11) Your output will be displayed.

**TASK 1:**

Draw a flow chart using LARP software that converts the input dollar to its Rupees exchange rate equivalent. Assume that the present exchange rate is 230.75 rupees against the dollar. Then display the rupees equivalent exchange rate.

**TASK 2:**

Write a C program that take a value from the user. Output 5 times the value.

**TASK 3:**

Write a C program that take input of 3 numbers from the user and print the given numbers in ascending order (Largest to small). Do it without using any repetitive structure.

**TASK 4:**

Draw flow chart using LARP to take a list of numbers from the user, numbers input by user may be even or odd, then determine the number of even and odd numbers entered by the user respectively. Keep on taking numbers from user until user enters a zero.

**SAMPLE INPUT:**

2, 4, 9, 15, 22, 8, 17, 30, 12, 1, 0.

**EXPECTED OUTPUT:**

Odd numbers: 4.

Even numbers: 6

**TASK 5:**

Draw a flow chart and write pseudo code using LARP to display the cube of the number up to the given n integers.

**SAMPLE INPUT:**

Input number of terms: 5

**EXPECTED OUTPUT:**

The number is: 1 and the cube of 1 is: 1

The number is: 2 and the cube of 2 is: 8

The number is: 3 and the cube of 3 is: 27

The number is: 4 and the cube of 4 is: 64

The number is: 5 and the cube of 5 is: 125

**TASK 6:**

Write a program that inputs two numbers from the user and determines if the first number is a multiple of the second number.

**TASK 7:**

The date June 10, 1960, is special because when we write it in the following format, the months times the days are equal to the year.

06/10/60

Write a program that asks the user to enter a month (in numeric/integer form), a day, and a two-digit year. The program should then determine whether the month times the day is equal to the year or not. If so, it should display a message saying the date is magic. Otherwise, it should display a message saying the date is not magic.

**TASK 8:**

Write a program that displays the following menu:

Geometry Calculator:

1. Calculate the area of a circle.
2. Calculate the area of a rectangle.
3. Calculate the area of a triangle.
4. Quit.

Enter your choice (1-4)

If the user enters 1, the program should ask for the radius of the circle and then display its area using the following formula:

$$\text{Area} = \pi r^2 \quad (\pi = 3.14159, r = \text{radius of circle})$$

If the user enters 2, the program asks for the length and width of the rectangle and then displays the area of the rectangle using the following formula:

$$\text{Area} = \text{length} * \text{width}$$

If the user enters 3 the program should ask for the length of the triangle's base and its height and then display its area, using the following formula:

$$\text{Area} = \text{base} * \text{height} * .5$$

If the user enters 4, the program should end.

### TASK 9:

Draw a flowchart using LARP to find the largest number among 30 numbers input by user and reduce it by 20%.

Take input in each iteration. Compare the first number with the next number and put the greater of the two numbers in the max. Then check each next input number with max and update max. At the end when largest number is found, reduce the max number by 20% and display the result.

--- THE END---

*“Success is the product of daily habits, not once in a lifetime transformation”*

*~James Clear*

# PROGRAMMING FUNDAMENTALS

BS-CS-F21 MORNING

Spring 2022 Semester

## LAB QUIZ 02

Monday 5<sup>th</sup> September, 2022

BCSF21M017

Time Allowed: 40 minutes

Max. Marks: 30

### Instructions:

- 1) Always start with the name of Allah Almighty, most beneficial and most merciful.
- 2) You are not allowed to take any help from anyone during quiz.
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- 4) Use of calculator is not allowed.
- 5) Store your files with following naming conventions:

LabQuiz\_<Lab quiz number>\_<student ID>\_T\_<Task ID>.<extension>  
e.g. for today's quiz, file names for student BCSF21M001 will be like following:

- a) LabQuiz\_02\_BCSF21M001\_T\_01.larp
- b) LabQuiz\_02\_BCSF21M001\_T\_02.larp
- c) LabQuiz\_02\_BCSF21M001\_T\_03.larp

- 6) Do not open your quiz until "Start Your Quiz" is announced by the teacher/TA.
- 7) Do not write ANYTHING after announcement of "STOP WRITING".
- 8) Understanding question is part of examination, so during quiz no query will be entertained.

In case of any negligence/violation about instructions, your quiz will be graded with zero/negative marks.

### For Invigilator Use Only:

Instruction No. Violated: \_\_\_\_\_

Details if Any: \_\_\_\_\_

Penalty: \_\_\_\_\_

Name: \_\_\_\_\_

Signature: \_\_\_\_\_

Task ID	Task 1	Task 2	Task 3	Task 4	Total
Max. Marks:	10	10	10	10	40
Obt. Marks:	10	6	8	10	30

Final Marks after deduction of penalty: \_\_\_\_\_

Name: \_\_\_\_\_

Marked by: \_\_\_\_\_

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**TASK 1:**

Write a C program that takes input of 2 numbers from the user and display the product without using multiplication (\*) operator.

**TASK 2:**

Write a C program that takes a positive number from the user and then display the 5 previous odd numbers in descending order.

**SAMPLE INPUT:**

Enter a number: 19

**SAMPLE OUTPUT:**

Five previous odd numbers are:

17    15    13    11    9

**Task 3:**

Identify the errors and rewrite the correct code. (You are not allowed to use any IDE/code editor/compiler) – You have to rewrite the correct version of code below this section.

**Anyone caught using above mentioned tools for solving this task, his/her quiz will be marked 0 and will be heavily penalized.**

**Bugged version:**

```
#include<stdio.h>

main(){
    int a,b,c,
    printf("Enter two numbers: ");
    scanf("%s%s",a,b);
    if(a<7<b)
        printf(a);
    else
        printf(b);
}
```

Write correct solution:

```
# include <stdio.h> ✓  
int main () { ✓  
    int a, b, c;  
    printf ("Enter two numbers: "); ✓  
    scanf ("%d %d", &a, &b); ✓  
    if (a < b) { (a < b) ✓  
        printf ("%d", a); ✓  
    } else { ✓  
        printf ("%d", b); ✓  
    }  
    return 0; ✓  
}
```

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# Programming Fundamentals: Lab-03

BS-CS-F21 Morning

Spring 2022 Semester

Monday 5<sup>th</sup> of September, 2022

Instructor: Dr. Saadia Shahzad

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## Instructions:

- 1) Always start with the name of Allah Almighty, most beneficial and most merciful.
- 2) Read the document carefully before start.
- 3) Don't hesitate to ask any questions from teacher and TAs but not from your fellows.
- 4) Use of mobile and internet is strictly not allowed.
- 5) Store your files with following naming conventions:

LabWork\_<Lab No.>\_<student ID>\_T\_<Task ID>.<extension>

e.g. for today's lab, file names for student BCSF21M001 will be like following:

- a) LabWork\_02\_BCSF21M001\_T\_01.larp
- b) LabWork\_02\_BCSF21M001\_T\_02.c etc.
- 6) At the end, compress your files in a .zip or .rar file with name like: LabWork\_02\_BCSF21M001.zip.  
If you are not familiar with this, you can ask TAs.
- 7) Lab work will be submitted at the end of every lab on LAN in a given folder name.

In case of any negligence/violation about instructions, your lab work will be graded with zero/negative marks.

## Instructions for writing C programs offline.

- 1) Click to open Windows Start Menu.
- 2) Type "Visual"
- 3) Select Visual Studio Command Prompt from list.
- 4) Move to your required directory using basic dir, md or cd commands.
- 5) Create/open a new file using Notepad file1.c
- 6) Write your first C program, save and exit notepad.
- 7) On command prompt, write:

cl file1.c

- 8) If there will be any errors, read them and edit/correct your code again using notepad.
- 9) When compiled successfully, an executable file named file1.exe will be created.
- 10) On command prompt, write:

file1

or write file1.exe

11) Your output will be displayed.

**Make sure you apply INPUT BOUND CHECKS on all inputs**

### TASK 1:

Write a C program that swaps the value of two integer variables.

Hint: You can use third variable for this purpose.

### **SAMPLE INPUT:**

Enter first number: 2.89

Enter second number: 5

### **SAMPLE OUTPUT:**

After swapping, first number: 5

After swapping, second number: 2.89

### TASK 2:

Write a C program that swaps the value of two integer variables. But you are not allowed to use third variable. You can only use two variables for this purpose.

### TASK 3:

Write a C program that counts multiples of a given number lying between two numbers.

### **SAMPLE INPUT:**

Enter the number: 3

Enter the lower limit of multiples: 5

Enter the upper limit of multiples: 21

**EXPECTED OUTPUT:**

Number of multiples of 3 between 5 and 21 is 6

**TASK 4:**

Draw flow chart using LARP to take seconds as input and calculates equivalent number of hours, minutes and seconds.

**SAMPLE INPUT:**

Enter time in seconds: 7890

**EXPECTED OUTPUT:**

7890 seconds = 2 hours : 11 minutes : 30 seconds

**TASK 5:**

Write a C program to input a number from user and print multiplication table of the given number using while loop.

**SAMPLE INPUT:**

Enter a number: 2

**EXPECTED OUTPUT:**

2 \* 1 = 2

2 \* 2 = 4

2 \* 3 = 6

2 \* 4 = 8

2 \* 5 = 10

2 \* 6 = 12

2 \* 7 = 14

2 \* 8 = 16

2 \* 9 = 18

### TASK 6:

A book store awards points to its customers based on the number of books purchased each month.

The points are awarded as follows:

- > If a customer purchases 0 books, he or she earns 0 points.
- > If a customer purchases 1 book, he or she earns 5 points.
- > If a customer purchases 2 books, he or she earns 15 points.
- > If a customer purchases 3 or more books, he or she earns 30 points.

Write a C program that asks the user to enter the number of books that he or she has purchased this month and displays the number of points awarded.

### TASK 7:

Write a program that prompts the user to input positive integers, if user enters a negative number display an error message: **Wrong Attempt! You have entered a negative number** and ask the user to enter a positive number again. Do this until user enters 0. At the end display the count of wrong attempts.

### TASK 8:

The colors Red, Blue, and Yellow are known as the primary colors because they cannot be made by mixing other colors. When you mix two primary colors, you get a secondary color, as shown here:

- > When you mix Red and Blue, you get Purple.
- > When you mix Red and Yellow, you get Orange.
- > When you mix Blue and Yellow, you get Green.

Write a C program that prompts the user to enter the 1<sup>st</sup> character of two primary colors to mix(R for Red, B for Blue, Y for Yellow). User's input should be stored in two variables of type char. If the user enters anything other than 'R', 'B' or 'Y' the program should terminate after displaying an appropriate error message. Otherwise, your program should display the name of the secondary color that results.

### TASK 9:

Write a pseudocode to enter cost price and selling price of a product and check profit or loss. Also calculate total profit or loss.

#### **SAMPLE INPUT1:**

Enter cost price: 1300

Enter selling price: 1700

#### **EXPECTED OUTPUT:**

Profit is Rs. 400

#### **SAMPLE INPUT2:**

Enter cost price: 800

Enter selling price: 600

#### **EXPECTED OUTPUT:**

Loss is Rs. 200

### TASK 10:

Draw flow chart using LARP to take a positive number from the user, find and display the first and last digit of a number. Also calculate and display the product of both first and last digits.

#### **SAMPLE INPUT:**

Enter a Number: 65418

#### **SAMPLE OUTPUT:**

First digit = 6

Last digit = 8

Product = 32

**TASK 11:**

Write a C program to check whether a Number is Palindrome or Not.

(A palindrome number is a **number that is same after reverse**. For example 121, 34543, 343, 131, 48984 are the palindrome numbers.)

--- *THE END---*

*"The struggle you're in today is developing the strength you need for tomorrow.*

*Don't give up! -"*

*~ Robert Tew*

# Programming Fundamentals: Lab-03

BS-CS-F21 Morning

Spring 2022 Semester

Monday 12<sup>th</sup> of September, 2022

Instructor: Dr. Saadia Shahzad

## Instructions:

- 1) Always start with the name of Allah Almighty, most beneficial and most merciful.
- 2) Read the document carefully before start.
- 3) Don't hesitate to ask any questions from teacher and TAs but not from your fellows.
- 4) Use of mobile and internet is strictly not allowed.
- 5) Store your files with following naming conventions:

LabWork\_<Lab No.>\_<student ID>\_T\_<Task ID>.<extension>

e.g.

- a) LabWork\_03\_BCSF21M001\_T\_01.larp
- b) LabWork\_03\_BCSF21M001\_T\_02.c etc.

- 6) At the end, compress your files in a .zip or .rar file with name like: LabWork\_03\_BCSF21M001.zip.  
If you are not familiar with this, you can ask TAs.
- 7) Lab work will be submitted at the end of every lab on LAN in a given folder name.

In case of any negligence/violation about instructions, your lab work will be graded with zero/negative marks.

```
int k
for (i=1 ; i < rows ; i++)
{
    for (int j=1 ; j < rows ; j++)
        cout << k << endl;
    k = k + 2;
}
```

## TASK 1:

Display the following pattern for entered number of rows:

```
1 2 3 4 5 6
1 3 5 7 9 11
1 4 7 10 13 16
1 5 9 13 17 21
1 6 11 16 21 26
1 7 13 19 25 31
```

**TASK 2:**

Print the following pattern for entered number of rows.

```

      *
     * * *
    * * * *
   * * * * *
  * * * * * *
 * * * * * * *

```

**TASK 3:**

Print Pascal's Triangle for entered number of rows.

**SAMPLE INPUT:**

6

**EXPECTED OUTPUT:**

```

 1
 1 1
 1 2 1
 1 3 3 1
 1 4 6 4 1
 1 5 10 10 5 1

```

$i=1$   
 $row = i = 5$   
 $row - 2 = k$

**TASK 4:**

Print the following pattern for entered number of rows:

**SAMPLE INPUT:**

5

**EXPECTED OUTPUT:**

```

***** *
*** * *
** * *
* * *
*

```

$$2(\text{rows} - 1) - (2i - 1)$$

$$2\text{rows} - 2 - 2i + 1$$

$$2(\text{rows} - i) - 1$$

TASK 5:

Print the diamond pattern for entered number of rows.

**SAMPLE INPUT:**

4

**EXPECTED OUTPUT:**

```

        *
      *   *
    *   *   *
  *   *   *   *
*   *   *   *   *

```

$i = 1 \rightarrow 2$

$\text{row } 1$

$6 - (2i - 1) \rightarrow 5$

$6 - 2i = 5 \rightarrow i = 3$

$6 - 2 = 4 \rightarrow i = 2$

$6 - 4 = 3 \rightarrow i = 1$

TASK 6:

Write a program that calculates factorial of the entered number.

(Factorial of 5 is:  $5 \times 4 \times 3 \times 2 \times 1 = 120$ )

**SAMPLE INPUT:**

6

**EXPECTED OUTPUT:**

Factorial of 6 is: 720

TASK 7:

Write a program to print the Floyd's Triangle for entered number of rows.

**SAMPLE INPUT:**

5

**EXPECTED OUTPUT:**

```

1
01
101
0101
10101

```

**TASK 8:**

✓ Write a program to identify whether entered (positive) number is perfect or not. (A perfect number is a positive integer that is equal to the sum of its positive divisors, excluding the number itself) e.g. divisors of 6 are 1, 2, 3 and 6.  $1+2+3=6$ , so 6 is a perfect number.

**SAMPLE RUN:**

4

Not a perfect number.

6

It is a perfect number.

28

It is a perfect number.

**TASK 9:**

✓ Write a program to display first k prime numbers where k is a number entered by user.

**SAMPLE RUN:**

10

Prime numbers: 2 3 5 7 11 13 17 19 23 29

**TASK 9:**

Write a program to display all perfect numbers less than k where k is a number entered by user

**SAMPLE RUN:**

100

Perfect numbers: 6 28

*--- THE END---*

*"First, solve the problem. Then, write the code."*

*- John Johnson*

**TASK 1:**

Ask the user to enter a positive number. Display the product of digits of that number.

**SAMPLE INPUT:**

545

**SAMPLE OUTPUT:**

Product of digits is: 100

**TASK 2:**

Write a program to validate day, month and year (>1900) in a date. (Concern of leap year can be ignored for now!)

**SAMPLE INPUT 1:**

15 12 2001

**SAMPLE OUTPUT 1:**

Valid date!

**SAMPLE INPUT 2:**

31 2 2011

**SAMPLE OUTPUT 2:**

Invalid date!

**TASK 3:**

Ask the user to enter a character. If user enters an alphabet in lower case, display "Character is in lower case" and display its upper case. If user enters an alphabet in upper case, display "Character is in upper case" and display its lower case. If user enters a digit, display a \*. If user enters any other character (except \$), display its ASCII value. Repeat this until user enters '\$' sign.

**SAMPLE RUN:**

Enter a character: d

Character is in lower case.

Upper case: D

Enter a character: R

Caracter is in upper case.

Lower case: r

Enter a character: 9

\*

Enter a character: ]

93

Enter a character: \$

# Programming Fundamentals: Lab-04

BS-CS-F21 Morning

Spring 2022 Semester

Monday 03<sup>rd</sup> of October, 2022

Instructor: Dr. Saadia Shahzad

## Instructions:

- 1) Always start with the name of Allah Almighty, most beneficial and most merciful.
- 2) Read the document carefully before starting.
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- 4) Use of mobile and internet is strictly not allowed.
- 5) Store your files with the following naming conventions:

Lab Work <Lab No.> <student ID> \_T\_<Task ID>. <extension>

e.g for today's lab, file names for student BCSF21M001 will be like the following:

- a) LabWork\_02\_BCSF21M001\_T\_01.larp
  - b) LabWork\_02\_BCSF21M001\_T\_02.c etc.
- 6) At the end, compress your files in a .zip or .rar file with a name like: LabWork\_02\_BCSF21M001.zip.  
If you are not familiar with this, you can ask TAs.
- 7) Lab work will be submitted at the end of every lab on LAN in a given folder name.

In case of any negligence/violation of instructions, your lab work will be graded with zero/negative marks.

## TASK 1:

Something which is not true is false, but something which is not not true is true! . Create a function where given n number of "not", evaluate whether it's true or false.

## TASK 2:

Write a program that calculates the average of a group of test scores, where the lowest score in the group is dropped. It should use the following functions:

- int getScore() should ask the user for a test score . This function should be called by main once for each of the five scores to be entered and return the score.
- Void calcAverage() should calculate and display the average of the four highest scores. This function should be called just once by main and should be passed the five scores.

- int findLowest() should find and return the lowest of the five scores passed to it. It should call by calcAverage, which uses the function to determine which of the five scores to drop.

### TASK 3:

Write a program that determines which of five geographic regions within a major city (North, South, East, West and Central) had the fewest reported automobile accidents last year. It should have the following two function:

- int getNumAccidents() is passed the name of the region. It asks the user for the number of automobile accidents reported in that region during the last year, validates the input, then returns it. It should be called once for each city region.
- void findLowest() is passed the five accident totals. It determines which is the smallest and prints the name of the region, along with its accident figure.

I am v / 8

### TASK 4:

Write a program that asks the user to enter an item's wholesale cost and its markup percentage. It should then display the item's retail price. For example:

- If an item's wholesale cost is 5.00 and its markup percentage is 100%, then the item's retail price is 10.00.
- If an item's wholesale cost is 5.00 and its markup percentage is 50%, then the item's retail price is 7.50.

The program should have a function named calculateRetail that receives the wholesale cost and the markup percentage as arguments and returns the retail price of the item.

### TASK 5:

Write a program to calculate the sum of numbers from 1 to n using recursion

### TASK 6:

Strong numbers are the numbers whose sum of factorial of digits is equal to the original number.

Example: 145 is a strong number because  $1! + 4! + 5! = 145$ .

Your task is to write a function that checks whether a given number is a strong number or not.

### TASK 7:

Scientist have discovered that in four decades, the world will EXPLODE! It will also take three decades to make a spaceship to travel to a new planet that can hold the entire world population. You must calculate the number of people there will be in three decades from now on.

- The variable **population** is the world population now.
- Assume that every month, someone gives birth to more people **n**. Return the number of people there will be when the spaceship is completed.

### **TASK 8 :**

Write a program that determines which of a company's four division (Northeast, Southeast, Northwest and Southwest) had the greatest sales for the quarter the quarter. It should include the following two functions:

- double **getSales()** is passed the name of a division. It asks the user for a division's quarterly sales figure, validates the input, then returns it. It should be called once for each division.
- void **findHighest()** is passed the four sales totals. It determines which is the largest and prints the name of the high grossing division, along with its sales figure.

### **TASK 9 :**

The post-paid Internet connections are charged on the basis of total time the Internet has been used in a month. Your friend has kept a record of the total time of usage in hours, minutes and seconds, every time he connected to Internet. To help your friend, write a program to calculate total charges of Internet connection after a month. The program should allow your friend to input the usage time of each connection in hours, minutes and seconds and should add it to the total usage time and then calculate the charges .The charges of the connection are 25 Rupees per hour (extra minutes and second from total are ignored).Implement three functions

1. Function to input the time (in hours, minutes and seconds) of usages in one sitting.
2. Function to add the input time to the total time of usage (Total time is also in hours, minutes and seconds.).
3. Function to calculate the total charges.

--- *THE END---*

*"Some people spend their entire lives waiting for the time to be right to make an improvement."*

*~James Clear(atomic habits)*

# Programming Fundamentals: Lab-04

BS-CS-F21 Morning

Spring 2022 Semester

Monday 26<sup>th</sup> of September, 2022

Instructor: Dr. Saadia Shahzad

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## Instructions:

- 1) Always start with the name of Allah Almighty, most beneficial and most merciful.
- 2) Read the document carefully before starting.
- 3) Don't hesitate to ask any questions from teacher and TAs but not from your fellows.
- 4) Use of mobile and internet is strictly not allowed.
- 5) Store your files with the following naming conventions:

LabWork\_<Lab No.>\_<student ID>\_T\_<Task ID>.<extension>

e.g. for today's lab, file names for student BCSF21M001 will be like the following:

- a) LabWork\_04\_BCSF21M001\_T\_01.larp
- b) LabWork\_04\_BCSF21M001\_T\_02.c etc.

- 6) At the end, compress your files in a .zip or .rar file with a name like: LabWork\_04\_BCSF21M001.zip.  
If you are not familiar with this, you can ask TAs.
- 7) Lab work will be submitted at the end of every lab on LAN in a given folder name.

In case of any negligence/violation of instructions, your lab work will be graded with zero/negative marks.

## TASK 1:

Consider the following algorithm to generate a sequence of numbers.

Start with an integer n. If n is even, divide by 2. If n is odd, multiply by 3 and add 1.

Repeat this process with the new value of n, terminating when n = 1.

For example, the following sequence of numbers will be generated for n = 22:

22 11 34 17 52 26 13 40 20 10 5 16 8 4 2 1

For an input n, the cycle-length of n is the number of numbers generated between n and 1, inclusive. In the example above, the cycle length of 22 is 16. Because by applying the above algorithm for n=22, 16 numbers are generated between n(i.e. 22) and 1.

Your task is to write a function that takes a number n and determines the number of cycles.  
 The prototype of the function is given below:

*int cycleSize(int n);*

**TASK 2:**

Print the following pattern using nested loops.

1	2	3
2	4	6
3	6	9
*****	*****	*****
2(e)	3	4
4	6 (e)	8 (e)
6	9	12
*****	*****	*****
3	4	5
6	8	10
9	12	15

---

**TASK 3:**

Write a function that prints a hollow square of a character (e.g. \*) of given size. Input size of square/number of rows from the user in function main(). Size of square and character to be printed are two parameters of the function printSquare.

Prototype of function is:

*void printSquare(int size, char ch);*

Enter the side of the square

```
5
* * * * *
*   *
*   *
*   *
* * * * *
```

#### TASK 4:

Write a function that prints the number of days in a month. The month is passed to the function by the user. (Use switch statements)

void <function-name>(int)

#### TASK 5:

Write a function that finds whether four integers a, b, c, and d passed to the function satisfy the equation

$$a^3 + b^3 + c^3 = d^3$$

The function returns 0 if the above equation is satisfied and returns -1 otherwise. Print proper message to console for both of the results.

int <function-name>(int, int, int, int)

#### TASK 6:

Write a program that prompts the user to enter their choice,

Print the following menu

1. Enter 1 for calculating the area of a circle.
2. Enter 2 for calculating the radius of a circle.
3. Enter 3 for calculating the diameter of a circle.
4. Enter 4 for calculating the circumference of a circle.

Write proper functions for each of the above options. Use switch statements to shift control of the program to proper function. Use value 3.14159 for 'pi'.

#### TASK 7:

Write a function that takes n input from the user, and determines the number of evens, odds, and zeros among those numbers.

#### TASK 8:

Print the following pattern.

## **TASK 9:**

Write a program that stores the elapsed time in a variable, this variable is passed to a function that outputs the elapsed time in hours minutes, and seconds. (For example, if the elapsed time is 9630, then the output from the function is 2:40:30).

--- THE END ---

*“Some people spend their entire lives waiting for the time to be right to make an improvement.”*

*~James Clear(atomic habits)*

### **TASK 1:**

Write a program that asks the user a question with four possible answers. The question is asked 10 times. With each question, Prompt the user to select the answer to that question (use switch statement). After all the input is gathered the program should output the number of times each answer was selected. You are not allowed to use if else statements in this question.

### **Explanation:**

There are four options for each question names as:

- Answer1, Answer2, Answer3, Answer4.

Each time question is asked, the user is asked to select the answer to that question either Answer1, Answer2, Answer3, or Answer4(use switch-statement).

When the question is asked 10 times and each answer is selected, among these four options display the answer which has been selected the most.

### **TASK 2:**

Print the following pyramid. Prompt the user to enter the height of the pyramid between 1 and 8 inclusive.

#### **Sample input 1:**

Height: 4

#### **Sample Output:**

```
      #      #
      ##     ##
      ###    ###
      #####  #####
```

#### **Sample input 2:**

Height: 8

#### **Sample Output 2:**

```
      #####
      #####
      #####
      #####
      #####
      #####
      #####
      #####
```

1X4X4  
80X4  
320 fuX4  
128

### **TASK 3:**

- 1) Declare an integer named choice
- 2) Print the following message on the screen

Enter 1 if you want to find the product of two numbers.

Enter 2 if you want to find the power of a number.

- 3) Using the switch statement to shift the control of the program to the proper functionality/option.
- 4) In the default case print the message "You entered wrong input!".

### TASK 1:

Write a function to check whether a number is Armstrong number or not. (An Armstrong number is a number that is equal to the sum of cubes of its digits. Extract each digit and add their cubes)

Sample Input: 371      27+

Output: The Number is Armstrong

$$\begin{array}{r} 3^3 \\ + 7^3 \\ \hline 370 \end{array}$$

### TASK 2:

Your friend runs a catering company. Some of the ingredients that his recipes require are measured in cups and some are measured in ounces. He has asked you to write a simple program that converts cups to fluid ounces.

- showIntro —This function will display a message on the screen that explains what the program does.
- getCups—This function will prompt the user to enter the number of cups and then will return that value as a double .
- cupsToOunces —This function will accept the number of cups as an argument and then return an equivalent number of fluid ounces as a double(1 Cup= 8 Ounce)

### TASK 3:

Future value formula:

$$F = P * (1 + i)^t$$

The terms in the formulas are as follows:

- F is the future value of the account after the specified time period.
- P is the present value of the account.
- i is the monthly interest rate.
- t is the number of months. Write a program that prompts the user to enter the account's present value, monthly interest rate, and the number of months that the money will be left in the account. The program should pass these values to a function named futureValue that returns the future value of the account, after the specified number of months. The program should display the account's future value.

$$\begin{aligned} & 2^2 \\ & = 4 \times 2 \quad (3) - 2 \\ & = 8 \\ (6 \times 6) \quad 6^3 & = 8 \\ 36 \times 6 & = 6 \times 6 \quad \checkmark \\ & = 36 \\ & = 36 \times 2 \end{aligned}$$

**Task 1:**

Create 2 char arrays of size 5. Your main function should only **declare and initialize 2 char arrays** and you are not allowed to change their data at any point during program execution.

Write a function with prototype:

**void intersection (char arr[], char arr2[])**

to calculate intersection of both arrays and display the resultant array.

**arr1-> bcjhk**

**arr2-> mnchg**

**output -> ch**

**Task 2:**

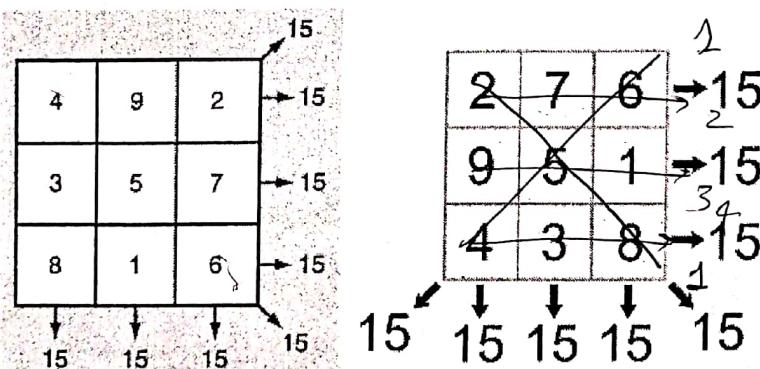
Create a char array and input it from user. Write a function to find the most occurring character in the array.

**Task 3:**

The Lo Shu Magic Square is a grid with 3 rows and 3 columns. The Lo Shu Magic Square has the following properties:

- The grid contains the numbers 1 through 9 exactly.
- The sum of each row, each column all add up to the same number.

Following are the examples:



$$i=0, j=2$$

$$i=1, j=1$$

$$i=2, j=0$$

$$\begin{aligned} & -12(4-24) \quad 1(1+9) \\ & +2(4-24) \quad 10-1(1+9) \\ & -12(-20) \quad 10-10 \\ & 2(-20) \quad 0 \end{aligned}$$

In a program you can simulate a magic square using a two-dimensional int array. Write a function that accepts a two-dimensional array as an argument, and determines whether the array is a Lo Shu Magic Square. Test the function in a main program.

-20(-10)  
2 | Page

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# Programming Fundamentals: Lab-07

BS-CS-F21 Morning

Spring 2022 Semester

Monday 24<sup>th</sup> of October, 2022

Instructor: Dr. Saadia Shahzad

## Instructions:

- 1) Always start with the name of Allah Almighty, most beneficial and most merciful.
- 2) Read the document carefully before starting.
- 3) Don't hesitate to ask any questions from teacher and TAs but not from your fellows.
- 4) Use of mobile and internet is strictly not allowed.
- 5) Store your files with the following naming conventions:

Lab Work\_<Lab No.>\_<student ID>\_T\_<Task ID>.<extension>

e.g for today's lab, file names for student BCSF21M001 will be like the following:

- a) LabWork\_07\_BCSF21M001\_T\_01.larp
  - b) LabWork\_07\_BCSF21M001\_T\_02.c etc.
- 6) At the end, compress your files in a .zip or .rar file with a name like: LabWork\_07\_BCSF21M001.zip.  
If you are not familiar with this, you can ask TAs.
- 7) Lab work will be submitted at the end of every lab on LAN in a given folder name.

In case of any negligence/violation of instructions, your lab work will be graded with zero/negative marks.

## TASK 1:

Write a C program which:

- Defines an array of size "10"
- Set Values of array by taking input from user
- Displays the unique elements on the Console
- If no element is unique then displays the message "**No element is unique**"

Sample Input	Output
2 3 4 5 6	Unique Elements: 2, 3, 4, 5, 6
89 89 55 34 55	Unique Element: 34
33 33 33 33 33	No element is unique

**TASK 2:**

You are given an array. You have to write a function that will print all the leaders in the array. An element is leader if it is greater than all the elements to its right side. The right most element is always a leader.

Sample Input	Output
6 7 4 3 5 2	7 5 2

$i = 3 \quad l = 4$

**TASK 3:**

Write a C program which:

- Defines an array of size “5”
- Set Values of array by taking Subject Marks of 5 subjects as an input from user
- Pass the array to the function **calculateGPA()**
- The function calculates & returns the GPA. Assume each subject is of 3 Cr. Hrs.
- Display the GPA on the Console.

Sample Input	Output
85 88 90 85 99	GPA: 4.0
83 99 72 77 82	GPA: 3.54

**TASK 4:**

Write a C program which:

- Defines an array of size “5”
- Set Values of array by taking numbers as an input from user
- Pass the array to the function **isSorted()**.
- The function finds whether a given array is sorted (ascending or descending both should be considered sorted) or not.

Sample Input	Output
5 8 12 22 34	Array is Sorted
5 12 0 -4 18	Array is not Sorted.
34 22 14 8 0	Array is Sorted.

**TASK 5:**

Write a function, which receives two character-arrays, and swap the contents of two equal size arrays.

Implement following function for this task:

- void swapArraya(char arr1[ ], char arr2[], int size)

--- *THE END*---

You don't have to be great to start, but you have to start to be great

-Zig Zagler

### TASK 1:

Take a 5x5 matrix from user. Check whether this matrix is skew-symmetric or not, using the function:

```
bool isSkewSymmetric (int mat [ ][5]);
```

A matrix 'M' is skew-symmetric if  $M^T = -M$ .

### TASK 2:

Input a char array from user consisting of multiple words (at least 10) separated by space. Then, ask the user to enter an alphabet. Write a function:

```
void makeStr (char* userString, char* newString, char c);
```

that adds all words (from userString) starting with the alphabet ( c ) entered by the user to newString. These words must be separated by ','.

**Consider the following structure for questions 3 and 4.**

struct dictionaryElement

{

    char word [15];

    char meaning [50];

};

### TASK 3:

Create a dictionary of 15 words. Enter data into it (hardcode). Write a function that asks user for a specific length of words, and displays all words of that length along with their meanings.

```
void wordsOfSpecificLength (struct dictionaryElement [ ]);
```

You are not allowed to use any built-in functions for this task.

Sample case: Consider the following words are in dictionary:

Embrace, borrow, absence, dialogue, foreign, violation, refuse, zone, ...

If user enters length 6, the output should be the following words with their meanings:

Borrow and refuse

### TASK 4:

Use the same dictionary from task 3. Take a char array input from user. Write a function that takes the dictionary and char array as input. Return a copy of the dictionaryElement whose meaning has given char array as sub-string.

```
dictionaryElement searchInMeaning (struct dictionaryElement *, char arr [ ]);
```

Sample case:

Consider there is a word **neighbor** with meaning 'a person living next door'. If user enters "door", then the word **neighbor** and its meaning should be displayed.

# Programming Fundamentals: Lab-11

BS-CS-F21 Morning

Spring 2022 Semester

Wednesday 16<sup>th</sup> of November, 2022

Instructor: Dr. Saadia Shahzad

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## Instructions:

- 1) Always start with the name of Allah Almighty, most beneficial and most merciful.
- 2) Read the document carefully before starting.
- 3) Don't hesitate to ask any questions from teacher and TAs but not from your fellows.
- 4) Use of mobile and internet is strictly not allowed.
- 5) Store your files with the following naming conventions:

Lab Work\_<Lab No.>\_<student ID>\_T\_<Task ID>.<extension>

e.g for today's lab, file names for student BCSF21M001 will be like the following:

- a) LabWork\_11\_BCSF21M001\_T\_01.larp
  - b) LabWork\_11\_BCSF21M001\_T\_02.c etc.
- 6) At the end, compress your files in a .zip or .rar file with a name like: LabWork\_11\_BCSF21M001.zip.  
If you are not familiar with this, you can ask TAs.
  - 7) Lab work will be submitted at the end of every lab on LAN in a given folder name.

In case of any negligence/violation of instructions, your lab work will be graded with zero/negative marks.

**YOU ARE NOT ALLOWED TO USE BUILT-IN-FUNCTIONS AND ARRAY SUBSCRIPT [] NOTATION. FOR ALL THE TASKS GIVEN BELOW.**

## TASK 1:

Write a C program to print the value and address of elements of an array using pointer notation.

### For Example:

Array elements with their addresses using pointers:

Value of arr[0] = 1	Address of arr[0] = Show Address Here
Value of arr[1] = 2	Address of arr[1] = Show Address Here
Value of arr[2] = 6	Address of arr[2] = Show Address Here
Value of arr[3] = 3	Address of arr[3] = Show Address Here
Value of arr[4] = 5	Address of arr[4] = Show Address Here
Value of arr[5] = 10	Address of arr[5] = Show Address Here

### **TASK 2:**

#### **A FUNCTION CAN RETURN MORE THAN ONE VALUE?**

Write a C Program to return more than one value from a function using Call By Reference

**Hint:** If data is passed by reference, a pointer to the data is copied instead of the actual variable as is done in a call by value. Because a pointer is copied, if the value at that pointers address is changed in the function, the value is also changed in main(). Also, value changed inside the function, is reflected inside as well as outside the function.

### **TASK 3:**

Create a C program that:

- Takes values of two integers as an input from user
- Swap (interchange) the values of integers using pointer
- Display the integer values after swapping

### **TASK 4:**

Write a C program which:

- Take number of data values as input from user
- Declare and initialize two pointers which points to largest and smallest value
- Display the values of the pointers as shown in the table below

Sample Input	Output
5	Largest Value is: 12
10 7 8 9 12	Smallest Value is: 7
3	Largest Value is: 100
100 87 98	Smallest Value is: 87.

*--- THE END ---*

Coding in today's language of creativity. All our children deserve a chance to become creators instead consumers of computer science.

-Maria Klawe