Lab # 3

Week = 1-May – 5-May-2023

Topics Covered:

- Functions
- Repetition Structure (Loop)

Problem Statement:

Write a program in which you have to define a function displayDiagnol which will have two integer arguments named rows and cols. In the main function, take the values of rows and columns from the users. If the number of rows is same as numbers of columns then call the displayDiagnol function else show a message on screen that number of rows and columns is not same.

The following logic will be implemented inside the displayDiagnol function:

The function will take the value of rows and cols which are passed as argument and print the output in matrix form. To print the values in the matrix form, nested loops should be used. For each loop, you have to use a counter variable as counter. When the value of counters for each loop equals, then it prints the value of row at that location and prints hard coded zero at any other location.

Example if the user enters rows and cols as 3, then the output should be like this

1 0 0

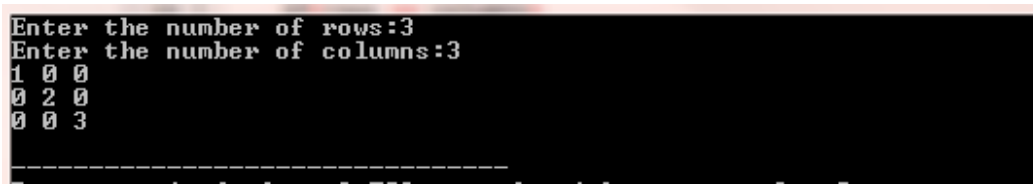
0 2 0

0 0 3

Example: when rows and columns are not same.

```
Enter the number of rows:3
Enter the number of columns:2
Wrong input! Num of rows should be equal to num of columns
--------------------------------
```

Example: when rows and columns are same.



Solution:

```
#include <iostream>

using namespace std;

void displayDiagonal(int,int); // function declaration


int main(){
	int rows, columns;//variable declaration and initialization
	rows = 0;
	columns = 0;

	cout<< "Enter the number of rows:";//Taking number of rows as input
	cin>> rows;

	cout<< "Enter the number of columns:";//Taking columns of rows as input
	cin>> columns;

	if(rows == columns)//conditional check for square matrix
	displayDiagonal(rows,columns); // call function
	else
	cout<< "Wrong input! Num of rows should be equal to num of columns";
```

```
	return 0;
}

// function definition
void displayDiagonal(int rows, int columns){

	for (int i = 1; i<=rows; i++) {
		for (int j = 1; j<=columns; j++){

				if(i==j)//diagonal check
				cout<<i<< " "; //displaying element
				else
				cout<< 0 << " ";
		}
		cout<< "\n";
	}
}
```

Lab # 2

Week = 24-Apr – 28-Apr-2023

Topics Covered:

- Repetition Structure (Loop)

Problem Statement: While Loop

“Calculate the average age of a class of ten students using while loop. Prompt the user to enter the age of each student.”

- We need 10 values of variable age of int type to calculate the average age.

  int age;

- “Prompt the user to enter the age of each student” this requires cin>> statement.

  For example:

  cin>> age;

- Average can be calculated by doing addition of 10 values and dividing sum with 10.

  TotalAge = TotalAge + age1;

  AverageAge = TotalAge / 10;

Solution:

```
#include<iostream>

using namespace std;


main() {

  // declaring variable age to take input
   int age=0;

 // declaring variables to calculate totalAge and averageAge
  int TotalAge = 0, AverageAge = 0;

// declaring ageCounter variable to check the number of iterations
int ageCounter=0;
```

```
// comparing the value of  ageCounter
        while (ageCounter <10)
        {
                cout<<"please enter the age of student "<<++ageCounter<<" :\t";
                cin>>age;
        //calculate totalAge by adding age of all students
                TotalAge = TotalAge + age;
        }


         cout<< "Total Age of 10 students = "<<TotalAge<<endl;
  // calculate AverageAge by dividing the totalAge with number of students
     AverageAge = TotalAge/10;


  //Display the result (average age)
    cout<<"Average of students is: "<<AverageAge;
}
```

Week = 17-Apr – 21-Apr-2023

Topics Covered:

- Variables
- Data Types
- Arithmetic Operators
- Precedence of Operators

Problem Statement:

"Calculate the average age of a class of ten students. Prompt the user to enter the age of each student."

- We need 10 variables of int type to calculate the average age.

  int age1, age2, age3, age4, age5, age6, age7, age8, age9, age10;

- "Prompt the user to enter the age of each student" this requires cin>> statement.

  For example:

  cin>> age1;

- Average can be calculated by doing addition of 10 variables and dividing sum with 10.

  TotalAge = age1 + age2 + age3 + age4 + age5 + age6 + age7 + age8 +age9 + age10 ;

  AverageAge = TotalAge / 10;

Solution:

```
#include<iostream>

using namespace std;

int main(){
```

```
// declaring 10 integer variables to take input of students age
int age1,age2,age3, age4, age5, age6, age7, age8, age9, age10;

// declaring variables to calculate totalAge and averageAge
int TotalAge = 0, AverageAge = 0;

// taking input of each student age
cout<<"please enter the age of student 1 ";

cin>>age1;

cout<<"please enter the age of student 2 ";

cin>>age2;

cout<<"please enter the age of student 3 ";

cin>>age3;

cout<<"please enter the age of student 4 ";

cin>>age4;

cout<<"please enter the age of student 5 ";

cin>>age5;

cout<<"please enter the age of student 6 ";

cin>>age6;

cout<<"please enter the age of student 7 ";

cin>>age7;

cout<<"please enter the age of student 8 ";

cin>>age8;

cout<<"please enter the age of student 9 ";

cin>>age9;

cout<<"please enter the age of student 10 ";

cin>>age10;

//calculate totalAge by adding age of all students
```

```
TotalAge = age1 +  age2 + age3 + age4 + age5 + age6 + age7 + age8 + age9 + age10;

// calculate AverageAge by dividing the totalAge with number of students
AverageAge = TotalAge/10;


//Display the result (average age)

        cout<<"Average of students is: "<<AverageAge;

}
```

Alternative Solution

```
#include<iostream>

using namespace std;

main() {
        // declaring variable age to take input
         int age=0;

       // declaring variables to calculate totalAge and averageAge
         int TotalAge = 0, AverageAge = 0;

         // using for loop to take input of each students and adding them
        for (int i = 1;i<=10;i++){

                cout<<"please enter the age of student "<<i<<" :\t";

                cin>>age;

                TotalAge += age;

        }

      // calculate AverageAge by dividing the totalAge with number of students
      AverageAge = TotalAge/10;


         //Display the result (average age)
```

```
        cout<<"Average of students is: "<<AverageAge;
}
```