National University of Computer and Emerging Sciences, Lahore Campus

	Course Name:	**Programming Fundamentals**	**Course Code:**	**CS1002**
	Program:	**Electrical Engineering**	**Semester:**	**Fall 2023**
	Duration:	**1 Hour**	**Total Marks:**	**30**
	Exam Date:	**08 Nov 2023**	**Weight:**	**15%**
	Section:	**All**	**Page(s):**	**4**
	Exam Type:	**Sessional - 2 Exam Solution**	**CLO #**	**2,3**

Student Name:_____ Roll No._____ Section:_____

Instructions:
1. Do not forget to write your Name and Roll Numbers.
2. Solve on the paper and Return. **Answer sheets are not required.**

Question No. 1 (CLO No. 3) **Marks: 15**

Generate an algorithm in the form of a C++ program as follows. The program contains a function (named speedCalculator()) that returns a double type value (i.e. speed in m/s). The function accepts two parameters as follows.

1) Double type speed in miles/hour. The function converts it into m/s and returns to the calling function
2) An integer type reference parameter named alertLevel. The function sets it as follows.
   alertLevel =1 if speed is up to 60 km/h
   alertLevel =2 if speed is between 61 km/h up to 80 km/h
   alertLevel =3 if speed is 81 km/h or above.

Write down a main function that uses this function as many times as user's wish, using a sentinel controlled while loop. For each user defined input value (in miles/hour) the program prints the speed in m/s and AlertLevel for that speed. **Do not take any input or print any output from within the function speedCalculator(). One mile is equal to 1.60934 km.**

A sample run for one iteration of the program should look like below:

Enter speed in miles/hour or -1 to terminate (the user enters 40)

Speed in m/s = 17**.**8816

Alert Level is 2 for the above speed.

Write down your code here

```
double speedCalculator(double milesPerHour, int & alertLevel)
{
    double kmPerHour, meterPerSecond;
    kmPerHour = milesPerHour*1.60934;
```

```
    meterPerSecond = kmPerHour*1000/3600;

    if(kmPerHour<=60)
        alertLevel=1;
    else if(kmPerHour>60 && kmPerHour<=80)
        alertLevel=2;
    else if(kmPerHour>80)
        alertLevel=3;

    return meterPerSecond;
}
int main ()
{
    double speed_miles_per_h, speed_meters_per_s;
    int alert_Level;

    cout<<" enter Enter speed in miles/hour or -1 to terminate "<<endl;
    cin>>speed_miles_per_h;

    while (speed_miles_per_h!= -1)
    {
    speed_meters_per_s = speedCalculator(speed_miles_per_h, alert_Level);
    cout<<" Speed in m/s = "<<speed_meters_per_s<<endl;
    cout<<" Alert Level is "<<alert_Level<<" for the above speed. "<<endl;
    cout<<" enter Enter speed in miles/hour or -1 to terminate "<<endl;
    cin>>speed_miles_per_h;
    }
    return 0; }
```

Question No. 2 (CLO No.2) **Marks: 15**

Generate output of the following C++ code segment, clearly show your working.

```
int row, col, noOfRows=8, noOfColumns=10;
	char ch ='*' ;
	for(row= 0; row < noOfRows; row++)
	{
		for(col= 0; col < noOfColumns; col++)
		{
			if (row== 0 ||row== 1 ||row== noOfRows-2 ||row==noOfRows-1)
			{ cout<<ch;}
			else if((col== 0 ||col== 1  ||col== noOfColumns-2 || col==noOfColumns-1))
			{ cout<<ch;}
			else
			{ cout<<' ';}
		}
		cout<<endl;
	}
```

Solution