National University of Computer and Emerging Sciences, Lahore Campus

	Course Name:	Programming Fundamentals	Course Code:	CS 118
	Program:	BS(CS)	Semester:	Fall 2020
	Duration:	90 Minutes	Total Points:	40
	Paper Date:	19/10/2020	Page(s):	9
	Exam Type:	Midterm-I	Section:	ALL

Registration No._____

Instructions:
Attempt all questions
Calculators are not allowed
You might use extra sheets for working but please try to write the final answer in the space provided for it

General Hints:

1. **Comparison of double/float type variables is exactly similar to int type variables**
2. **For arithmetic operators if one of the variable/value type is double/float and one is int then the answer is floating point value.**

SHORT QUESTIONS

1. The following program segment has been written to print a simple message in case the input number is a **positive integer** and **contains exactly 5-digits** (not less than 5 or more than 5-digits). What condition should be written within the parenthesis so that the program segment works correctly? Please remember that you are not allowed to use any other variables or add any new instruction in the program segment. Just write the condition using the already declared variable(s). **[3 Points]**

```
int num = 0;
cin >> num;
if(_____________________________________________)
     cout<<" It is a five digit positive number";
else
     cout<<" It is not a five digit positive number ";
```

WRITE YOUR ANSWER HERE

ONE POSSIBLE WAY OF WRITING THE CONDITION IS

```
9999 < num && num < 100000
```

2. For each of the following program segments, specify the output it will produce when executed.

[8 = (1 + 1 + 1 + 1 + 1 + 1 + 1 + 1) Points]

Program Segment	Output

`int z = 0;`
`z = 27 / 4;`
`cout << "z = " << endl<<z;`
	z =
	6

`int num = 4;`
`if ( num % 2 == 0 )`
`  cout << num / 2;`
`else`
`  cout << num * 4;`
	2

`int RollNo, rollno;`
`RollNo = 5;`
`rollno = 8;`
`cout << "Roll No is " << rollno;`
	Roll No is 8

`int delta = 0, x =3;`
`if( x % 2 == 1)`
`  delta = delta + x;`
`x = x + 1;`
`if( x % 2 == 0)`
`  delta = delta + x;`
`x = x + 1;`
`if( x % 2 == 0)`
`  delta = delta + x;`
`cout << delta;`
	7

`int num = 56;`
`if( num % 7 ){`
`  cout<<"Number is divisible by 7\n";`
`}`
`else{`
`  cout<<"Number is not divisible by 7\n";`
`}`
	Number is not divisible by 7

Program Segment	Output

`int i, j, k;`
 	
`i = 5; j = 3; k = 7;`
 	
`if (i < j) {`
`  if (j < k)`
`  i = j;`
`  else`
`  j = k;`
`}`
`else`
`{`
`  if (j > k)`
`  j = i;`
`  else`
`  i = k;`
`}`
`cout << "i = " << i << " j = " << j << " k = "`
`<< k << endl;`
	i = 7 j = 3 k = 7

`int a = 30, b = 20, c = 10, d = 8;`
 	
`cout << ( (a >=b) == ( d > c) )`
 	
`<< (c < a) << ( b + c == a);`
	011

`int a = 30, b = 20, c = 10, d = 8;`
 	
`cout << (a + b / d - c) * (a % b) - ( d / c);`
	220

3. Following program has been written to compute and display average of three numbers but it is not producing correct output. For example when we input numbers 1, 2 and 3 the program display 4 whereas the actual average is 2.

   Suggest a simple change **in a single line** of the program that will correct this logical error. You must also rewrite the **corrected line (only)** in the space provided below **[3 Points]**

```
#include<iostream>

using namespace std;

int main(){

     double num1, num2, num3, avg;
     cin >> num1;

     cin >> num2;

     cin >> num3;

     avg = num1 + num2 + num3 /3;

     cout << "The average of three numbers is "<< avg ;

     return 0;
}
```

YOUR ANSWER GOES HERE

avg = (num1 + num2 + num3) /3;

4. Following program has some syntax errors. Identify all the syntax errors and write each line correctly so that the program compiles without errors **[6 Points]**

PROGRAM LINES WITH ERROERS	**PROGRAM WITHOUT ERROR**
`#include<iostream>`	`#include<iostream>`
`Using namespace std;`	`using namespace std;`
`int main()`	`int main()`
`{`	`{`
`integer TC , FH;`	`int TC, FH;`
`cout << 'Temperature IN';`	`cout << "Temperature IN";`
`cin << T;`	`cin >> TC;`
`F << 9\5.0* T + 32`	`FH = 9/5.0* TC + 32;`
`COUT >> "Temperature OUT" << F <Endl`	`cout << "Temperature OUT" << F < endl;`
`Return 0;`	`return 0;`
`}`	`}`

WRITING C++ PROGRAMS

Problem No 1: [Currency Conversion] [7 Points]

International travelers often need to convert some amount of money from currency into another. For example, a Pakistani traveler to Malaysia got his amount converted into US Dollars and Ringgit Malaysia. In Malaysia he needed more Ringgits so he got some of his US Dollars converted into Ringgits. The calculations for conversions are really simple but travelers are not typically good at math.

In this problem you are required to write a simple program that will take two inputs i) the amount to be converted ii) the rate of conversion, and then display the amount that the traveler must receive after conversion. The formula for conversion is

Target Amount = **Amount** multiplied by the **Exchange Rate**

Write a program in the space provided below where the marks will be awarded for

- Correct indentation. [1 Points]
- Using number of correct type of variables. [1 Points]
- Correct inputs and input validation (amount and rate > 0) [2 Point]
- Correct calculations [2 Points]
- Correctly showing the answers and messages. [1 Points]

Write your program in the space provided on the next page

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```
#include<iostream>

using namespace std;

int main()
{
    double Amount, Rate, NewAmount;

    cout<<"Enter Positive Amount  ";
    cin >>Amount;

    cout<<"Enter Positive Rate ";
    cin >>Rate;

    if(Amount > 0  && Rate > 0)
    {
        NewAmount = Amount * Rate;
        cout<<"Original Amount: "<<Amount<<endl
            <<"Rate:            "<<Rate<<endl
            <<"After Conversion "<< NewAmount<<endl;
    }
    else
    {
        cout<<" Amount and Rate must be positive";
    }
    return 0;
}
```

Problem No 2: [BODY MASS INDEX CALCULATOR] [13 Points]

The **BMI (B**ody **M**ass **I**ndex) is calculated using height **(measured in meters)** and weight **(measured in Kg)** of a person. A person with **BMI** of 25.0 or more is considered **overweight**, while the **healthy/normal range is 18.5 to 24.9** and a person with **BMI** less than 18.5 is considered **underweight**. The formula for computing BMI is

$$\textbf{BMI} = \textbf{weight}/\ \textbf{height}^2$$

Where the weight is in kilograms and height is in meters.

Write a program that can be used to compute the BMI of a person. Your program must input **weight** in **Kilograms** and **Height** in **centimeters.** Your program must convert the height into meters (1 Meter = 100 centimeters) and then use it to compute the BMI of the person using formula described above. The program **must display** a message indicating if the person is **underweight**, **overweight** or has **normal** weight. Marks will be awarded for

- Correct indentation. [2 Points]
- Using number of and correct type of variables. [2 Points]
- Correct conversions and calculations [4 Points]
- Correctly showing the answers and messages. [5 Points]

Write your program in the space provided on the next page

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```
#include<iostream>
using namespace std;
int main()
{
    double Weight, Hight_Centimeters, Hight_Meters, BMI;
    cout<<"Enter Weight in Kilograms ";
    cin >> Weight;

    cout<<"Enter Height in centimeters ";
    cin >> Hight_Centimeters;

    if(Weight > 0 && Hight_Centimeters > 0)
    {
        Hight_Meters = Hight_Centimeters/100;
        BMI = Weight /(Hight_Meters * Hight_Meters);
        cout<<"Person with Hight "
            << Hight_Centimeters<<" cm "
            <<"Weight =  "<< Weight<<" Kg "
            <<"Has BMI = "<< BMI<<endl;
        if(BMI < 18.5)
            cout<<"Person is UNDERWEIGHT"<<endl;
        else if(18.5 <= BMI && BMI < 24.9)
            cout<<"Weight is NORMAL"<<endl;
        else
            cout<<"Person is OVERWEIGHT"<<endl;

    }
    else
    {
        cout<<"Invalid Height or Weight: Positive Values Only Please";
    }
    return 0;
}
```

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