PF – Mid-2 Solution

Write the output of the given code in the space provided.
(Suppose there is no error)

Q1		20

Sr.	Code	Answer
| a. | ```cpp
for (int i = 1; i <= 3; ++i)
{
    for (int j = 1; j <= i; ++j)
    {
        for (int k = 1; k <= j; ++k)
            cout << '*';
        cout << endl;
    }
    cout << endl;
}
``` | ```
*

*
**

*
**
***
``` |
| b. | ```cpp
for (int i = 1; i <= 4; i++)
    {
        for (int j = 1; j <= 4; j++)
        {
            if (i == j)
            {
                cout << "0 ";
            }
            else
            {
                cout << "1 ";
            }
        }
        cout << endl;
    }
``` | ```
0 1 1 1
1 0 1 1
1 1 0 1
1 1 1 0
``` |
| c. | ```cpp
int i = 0;
    int j = 5;
    while ( i < 10 && j > 0 )
    {
        cout << i * j;
        j = i - j;
        i++;
    }
``` | ```
0
``` |
| d. | ```cpp
int main()
{
 int firstNum = 28;
 int secondNum = 25;
 cout << (firstNum = 38 - 7) << endl;
 cout << (firstNum <= 75) << endl;
 cout << (firstNum > secondNum + 10) <<
endl;
cout << (firstNum >= 3 * secondNum - 100)
<< endl;
cout << (secondNum - 1 == 2 * firstNum) <<
endl;
}
``` | ```
31
1
0
1
0
``` |

e.	```cpp
	int main()
	{
	    int r,a,b,c;
	    r = (a>b?(a>c?5:7):(b>c?9:10));
	    cout<<r;
	    return 0;
	}
	``
		Question Skipped due to ambiguous statement. Marks adjusted in above parts.

Q2	15

$$1 - \frac{x^2}{2!} + \frac{x^4}{4!} - \frac{x^6}{6!} + \frac{x^8}{8!} - \ldots$$

Sum =

1. Calculate the power of "**X**" to "**n**" using a loop.   (3.5 Marks)
2. Calculate the factorial of a number "**X**" using a loop.   (3.5 Marks)
3. Use the solution of parts 1 and 2 to find the sum of the series up to "**n**" terms.   (8 Marks)

Solution:

```cpp
#include <iostream>
int main()
{
    // all necessary variables
    double x, sum = 1.0;
    int n, even = 2;

    // Input values of x and n from the user
    std::cout << "Enter the value of X and N: ";
    std::cin >> x >> n;
```

```cpp
    // Part-1: Power of X-to-N
    double ans = 1.0;
    for (int i = 0; i < n; i++)
    {
        ans = ans * x;
    }
```

```cpp
    // Part-2: Factorial of X
    int fact = 1;
    for (int j = 1; j <= x; j++)
    {
        fact = fact * j;          -----------
    }
```

```cpp
    // Part-3: Sum of the series up to n terms
    for (int k = 1; k < n; k++)              -----------
    {
        // Correct loop condition for Power -----------
        for (int i = 0; i < even; i++)
        {
            ans = ans * x;          -----------
        }

        // Correct loop condition for Factorial---------
        for (int j = 1; j <= even; j++)
        {
            fact = fact * j;        ----------
        }
```

```cpp
        //Alternate addition and subtraction for even/odd iteration
        if (k % 2 == 0)
        {
                sum = sum + ans / fact;
        }
        else
        {
                sum = sum - ans / fact;
        }

        // updating variables after each iteration
        even = even + 2;
        ans = 1.0;
        fact = 1;
    }
```

```cpp
    // Output the result
    std::cout << "Sum of the series = " << sum << std::endl;

    system("pause");
    return 0;
}
```

Q1.

a. If the number of items bought is less than 5, then the shipping charges are 200.00 for each item bought; if the number of items bought is at least 5, but less than 10, then the shipping charges are 150.00 for each item bought; if the number of items bought is at least 10, there are no shipping charges. Write down the code to calculate the correct shipping charges.   5

```
//Check for Items below 5
if (numOfItems > 0 && numOfItems < 5)
      shippingCharges = 200.0 * numOfItems ;
//To check for at-least five but less than 10
else if (numOfItems >= 5 && numOfItems < 10)
      shippingCharges = 150.00 * numOfItems ;
//It must be there to avoid for -ve values
else if (numOfItems >= 10)
      shippingCharges = 0.0;
```

b. Suppose that **classStanding** is a char variable, **gpa** and **dues** are double variables. Write a switch expression that assigns the dues as following: If classStanding is 'f' or 'F', the dues are 20000.00; if classStanding is 's' or 'S', (if gpa is at least 3.75, the dues are 15000.00; otherwise dues are 10000.00); if classStanding is 'j' or 'J', (if gpa is at least 3.75, the dues are 9000.00; otherwise dues are 11000.00); if classStanding is 'n' or 'N', (if gpa is at least 3.75, the dues are 5000.00; otherwise dues are 7500.00). (Note that the code 'f' stands for first year students, the code 's' stands for second year students, the code 'j' stands for juniors, and the code 'n' stands for seniors.)   10

```
char classStanding;
double gpa, dues;
switch (classStanding)
{
case 'f':
case 'F':
      dues = 20000.0;
      break;
case 's':
case 'S':
      if (gpa >= 3.75)
                        //and above gpa

            dues = 15000.0;
      else
            dues = 10000.0;
      break;
case 'j':
case 'J':
      if (gpa >= 3.75)
            dues = 9000.0;
      else
            dues = 11000.0;
      break;
case 'n':
case 'N':
      if (gpa >= 3.75)
            dues = 5000.0;
      else
            dues = 7500.0;
```

```
            break;
}
```

c. Write down the following scenario using conditional (ternary) operator. The grade allocated to the students
```
        5 = 2.5 * 2
```
i.   ```
        if (x + y > 15)
                y = x;
        else if (x == y)
                y = 2 * y;
        else
                y = 2 * x;
```

```
y = (x + y > 15) ? x : (x == y) ? 2 * y : 2 * x; preferred solution
```
                                    OR
```
(x + y > 15) ? y = x : (x == y) ? y = 2 * y : y = 2 * x;
```

ii.     ```
        if (x + y > 15) {
                if (x == z)
                        z = x + 5;
                else
                        z = x;
        }
        else if (x < y)
                z = x + y;
        else
                z = x * y;
```

```
z = (x + y > 15) ? (x == z) ? x + 5 : x : (x < y) ? x + y : x * y;
```