Loops - More Practice Questions

Loops / Nested Loops

Content:

1) Loops
2) Nested loops
3) Some Problems from Past Papers

Run following programs in separate .cpp files and carefully understand the output.

//code1.cpp//////////////////////////////////

```
int main()//code to print series from 1 . . . 10 and calcuale its sum
{
	int count = 1;//counter variable
	int sum = 0;//variable to calculte and store running sum (accumulator)
	while (count <= 10)///header of while loop
	{//body of while loop
		cout << count <<" ";
		sum += count; //calculating running sum
		count++;
	}
	cout << "\n\nSum of series from 1 . . . 10   =  "<<sum <<endl;

}
```

//////////////////////////////factorial code//////////////////////////

b)

```
int main()
{
	int number;
	int fact = 1;//variable to calculate factorial initialized with 1(accumulator)

	cout << "\nEnter number to find factorial  :  ";
	cin >> number;

	while (number > 1)//while loop header
	{ //body of while loop
		fact = fact * number;
		number--;
	}

	cout << "\nFactorial of number is   =  " << fact<<endl;

}
```

…….**code Segment 1** ……..

```
const int MIN_NUMBER = 1, MAX_NUMBER = 10;

      int num = MIN_NUMBER;


    while (num <= MAX_NUMBER)
    {
      cout << num << setw(10) << (num * num) << endl;
      num++;
      }
```

…….code Segment 2 ……..

```
       int i=10;
    while (i>0)
    {
          cout<<setw(i)<<"*"<<endl;
          i--;
    }
```

…….code Segment 3 ……..

```
       int i=5;

    while (i>0)
    {
          cout<<setw(i)<<"*"<<endl;
          i--;
    }
    while (i<4)
    {
          cout<<setw(i+2)<<"*"<<endl;
          i++;
    }
```

…….code Segment 4 ……..

```
int a = 0;
      while (a < 59)
      {
            if (a % 5 == 0)
                  cout << a << " ";
            a++;
      }
      cout << '\n';
```

Challenge1: rewrite above code by using for loop

Challenge2: rewrite above code by using continue statement with while loop
Challenge3: rewrite above code by using continue statement with for loop

What is wrong with the following code Segments? Explain.

.....code Segment 1 .....

```
       int num1 = 0, num2 = 10, result;
num1++;
result = ++(num1 + num2);
cout << num1 << " " << num2 << " " << result;
```

.....code Segment 2 .....

```
int num1 = 0;

while (num1<=10)
      cout<<num1;
      num1++;
```

.....code Segment 3 .....

```
int num = 1;

while ( )
{
      cout<<num;
      num1++;
}
```

.....code Segment 4 .....

```
int num, bigNum, power, count;
cout << "Enter an integer: ";
cin >> num;
cout << "What power do you want it raised to? ";
cin >> power;
bigNum = num;
while (count++ < power);
      bigNum *= num;

cout << "The result is "<< bigNum << endl;
```

.....code Segment 5 .....

```
int count = 1, total;
while (count <= 100)
      total += count;
```

```
cout << "The sum of the numbers 1-100 is ";
cout << total << endl;
```

1. Compile the following code segment and explain what logic of code is? Rewrite it with same logic without continue statement.

```
int x = 100;

      while (x > 0)
      {
            cout << "\nEnter a value:   ";
            cin >> x;
            if (x == 1)
            {
                  x--;
                  continue;
            }
            cout << "x = " << x << '\n';
      }
```

Challenge: Convert or rewrite above code using do-while loop.

// PART 2
//
//

Reprogram codes with more efficient and clean logics.

1. Dry run following code segments and show the output.

.....code Segment -1 Sentinel 1 .....

```
int points, sum=0;

cout<<"\nEnter a vlaue to sum OR -1 for Exit :  ";
cin>>points;

while(points != -1)
{
      sum += points;
      cout<<"\nEnter a vlaue to sum OR -1 for Exit :  ";
      cin>>points;
}
cout<<"\n Total Sum is = "<<sum;
```

Convert or rewrite above code using do-while loop.

.....code Segment-2 Sentinel 2 .....

```
int value;

cout<<"\nEnter a vlaue in Range 1 to 1000 :  ";
cin>>value;

while(value <0 || value>1000)
{

    cout<<"\nEntered Value is not in range  "<<value<<"\nEntered another Value : ";
    cin>>value;
}
```

Convert or rewrite above code using do-while loop.

Do Practice setw( ) before doing code segments below. Do practice cout.fill( ).

…….code Segment-3 Pattern-1 Single loop……..

```
int i=10;


while (i>0)
{
      cout<<setw(i)<<left<<"*"<<setw(i)<<right<<"*";
      cout<<endl;
      i--;
}
```

Convert or rewrite above code using for loop.

…….code Segment-3A Pattern-1 Single loop……..

```
int i=10;
cout.fill('#');


while (i>0)
{
      cout<<setw(i)<<left<<"*"<<setw(i)<<right<<"*";
      cout<<endl;
      i--;
}
```

Convert or rewrite above code using for loop

…….code Segment-4 Pattern-2 Single loop ……..

```
int i=1;


   while (i<=12)
```

```
{
	cout<<setw(i)<<left<<"*"<<setw(i)<<right<<"**";
	cout<<endl<<endl;
	i +=2;
}
```

Convert or rewrite above code using for loop

…….code Segment-5 Pattern-3 Single loop ……..

```
	int i=1;
	int j=10;

	while (i<10)
	{
		cout<<setw(j)<<"*"<<setw(i)<<"*";
		cout<<endl;
		i+=2;
		j--;
	}

	i=9;
	j++;
	while (i>0)
	{
		cout<<setw(j)<<"*"<<setw(i)<<"*";
		cout<<endl;
		i-=2;
		j++;
	}
```

Convert or rewrite above code using for loop

…….code Segment-5 Pattern-3A Single loop ……..

```
int i=1;
	int j=10;

	char ch = '#';
	cout.fill(ch);
	while (i<10)
	{
		cout<<setw(j)<<"*"<<setw(i)<<"*";
		cout<<endl;
		i+=2;
		j--;
	}

	i=9;
	j++;
	while (i>0)
	{
		cout<<setw(j)<<"*"<<setw(i)<<"*";
		cout<<endl;
		i-=2;
```

```
            j++;
        }
```

…….code Segment-6 Pattern-4 Single loop ……..

```
int i=6;
   int j=2;

   while (i>0)
   {
         cout<<setw(j)<<"*"<<setw(i)<<"*";
         cout<<endl;
         i-=2;
         j++;
   }

   i=2;
   j=4;

   while (i<8)
   {
         cout<<setw(j)<<"*"<<setw(i)<<"*";
         cout<<endl;
         i+=2;
         j--;
   }
```

Convert or rewrite above code using for loop

…….code Segment-7 Pattern-4 nested loop ……..

```
int counter = 0;
   int i, j;

   while (counter<=9)
   {
         if (counter %2 ==0)
         {
               i=6;
               j=2;

               while (i>0)
               {
                     cout<<setw(j)<<"*"<<setw(i)<<"*";
                     cout<<endl;
                     i-=2;
                     j++;
               }
               counter ++;
         }
         else
         {

               i=2;
```

```
            j=4;

            while (i<8)
            {
                  cout<<setw(j)<<"*"<<setw(i)<<"*";
                  cout<<endl;
                  i+=2;
                  j--;
            }
            counter ++;
      }
}
```

// ***PART 3***
//
////

…… **code Segment-8 Nesting** ……..

```
      int a=1;
      int b=1;

      while(a<=6)
      {
            b=1;
            while(b<=a)
            {
                  cout<<"*";
                  b++;
            }
            cout<<endl;
            a++;
      }
      while(a>=1)
      {
            b=1;
            while(b<=a)
            {
                  cout<<"*";
                  b++;
            }
            cout<<endl;
            a--;
      }
```

Convert or rewrite above code using for loop

……..**code Segment** ……..

```
            int a=6;
            int b=1;
            int c=1;
```

```
while(a>=1)
{
      b=1;
      while(b<a)
      {
            cout<<"-";
            b++;
      }
      c=1;
      while(c<=7-a)
      {
            cout<<"*";
            c++;
      }
      cout<<endl;
      a--;
}

 a=6;
 b=1;
 c=1;


while(a>=1)
{
      b=1;
      while(b<8-a)
      {
            cout<<"-";
            b++;
      }
      c=1;
      while(c<a)
      {
            cout<<"*";
            c++;
      }
      cout<<endl;
      a--;
}
```

Code from previous Exams.

Consider the following code below:

```
int main()

{

int n = 6, x = 2, i = 0;

  while (i <= n)
  {
     if (i%2==1)
          x = x + pow(2,i) *
i;
     i++;
     cout << x <<"-";
 }


return 0;

}
```

1) Dry Run the code

2) Output of code

3) Convert the above code using for loop:

Write the output of the following programs (if any). If there is an error in the program, correct the code and then write the output.

`int main(){`
`  int i = 0, x = 0;`
`  do`
`  {`
`  if(i % 5 == 0)`
`  {`
`  cout<<x;`
`  x++;`
`  }`
`  ++i;`
`  }while(i<10);`
`  cout<<x;`
`  return 0;`
`}`	

`int K = 5;`
`int I = -2;`
`while (I <= K){`
`  I = I + 2;--K;`
`  cout << (I + K) << endl;`
`}`	

`int main(){`
`  char i = 0;`
`  for (; i++; cout<<int(i));`
`  cout<<int(i);`
`  return 0;`
`}`	

`int main(){`
`  int count = 0;`
`  for (;;) {`
`  if (count == 10)`
`  break;`
`  cout<<++count;`
`  }`
`  return 0;`
`}`	

`int main(){`
`  int count;`
`  for(count = 0;count<10;++count){`
`  cout<<"#";`	

`        if (count > 6)`
`            continue;`
`        cout<<count;`
`    }`
`    return 0;`
`}`	

`int main(){`
`    int loopvar = 5;`
`    while (cout<<"Hello " && loopvar--);`
`    return 0;`
`}`	

`int main(){`
`    int i, j, var = 'A';`
`    for (i = 5; i >= 1; i--) {`
`        for (j = 0; j < i; j++)`
`            cout<<char (i+var + j);`
`        cout<<endl;`
`    }`
`    return 0;`
`}`	