Programming Fundamentals – Video Lesson

Loops and Files

Write a program block that displays the number 99 four times on the screen

Ans: cout << 99 << " " << 99 << " " << 99 << " " << 99;

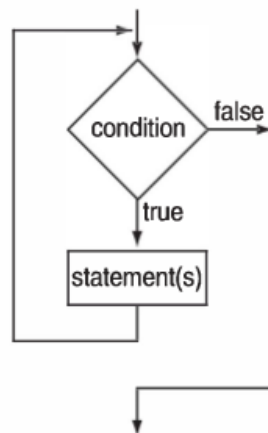How would you write a program block that displays the number 871.67 forty times on the screen?

Ans:

```
cout << 871.67 << " " << 871.67 << " " << 871.67 << " " << 871.67 << endl;
cout << 871.67 << " " << 871.67 << " " << 871.67 << " " << 871.67 << endl;
cout << 871.67 << " " << 871.67 << " " << 871.67 << " " << 871.67 << endl;
cout << 871.67 << " " << 871.67 << " " << 871.67 << " " << 871.67 << endl;
cout << 871.67 << " " << 871.67 << " " << 871.67 << " " << 871.67 << endl;
cout << 871.67 << " " << 871.67 << " " << 871.67 << " " << 871.67 << endl;
cout << 871.67 << " " << 871.67 << " " << 871.67 << " " << 871.67 << endl;
cout << 871.67 << " " << 871.67 << " " << 871.67 << " " << 871.67 << endl;
cout << 871.67 << " " << 871.67 << " " << 871.67 << " " << 871.67 << endl;
cout << 871.67 << " " << 871.67 << " " << 871.67 << " " << 871.67 << endl;
```

The While Loop

View this video: https://youtu.be/BptaY9bE8l0

```
while (condition)
{
    statement;
    statement;
    // Place as many statements
    // here as necessary
}
```


How many lines will each of the following while loops display?

A) int count = 1;
   while (count < 5) {
       cout << "My favorite day is Sunday \n";

```
            count = count + l;
        }
```
Ans: <mark>4 lines are displayed.</mark>

B) int count = 10;
```
    while (count < 5) {
        cout << "My favorite day is Sunday\n";
        count = count – 1;
    }
```
Ans: <mark>0 lines are displayed.</mark>

C) int count = 1;
```
    while (count < 5) {
        cout << "My favorite day is Sunday\n";
    }
```
Ans: <mark>Infinite loop.</mark>

D) int count = 1;
```
    while (count <= 5){
        cout << "My favorite day is Sunday \n ";
        count = count + 1;
    }
```
Ans: <mark>5 lines are displayed.</mark>

Write a code segment that uses a while loop to display the odd numbers from 1 through 15.

Ans:
```
int num = 1;
while (num <= 15)
{
    if (num % 2 != 0)
    {
        cout << num <<endl;
    }
    num ++;
}
```

Loops and Input Validation

Review this program block. What is the output if score is entered at line 3 as -72?

int score;
cout << "Enter score between 0 and 100: ";
cin >> score;
while(score < 0 || score > 100){
    cout << "Out of range...try again\n";
    cout << "Enter score between 0 and 100: ";
    cin >> score;
}
	Out of range...try again
	Enter score between 0 and 100:

Increment and Decrement operators

What will each of the following program segments display?

A) x = 2;
    y = x++;
    cout << x << " " << y;
	3 2

B) x = 2;
    y = ++x;
    cout << x << " " << y;
	3 3

C) x = 2;
    y = 4;
    cout << x++ << " " << --y;
	2 3

D) x = 2;
    y = 2 * x++;
    cout << x << " " << y;
	3 4

E) x = 99;
    if (x++ < 100)
        cout << "It is true! \n ";
    else
        cout << "It is false! \n ";
	It is true!

F) x = 0;
    if (++x)
        cout << "It is true! \n ";
    else
        cout << "It is false! \n " ;
	It is true!

Count-Controlled Loop

View this video: https://youtu.be/rhYouy229DA

What is the purpose of count++ ?

   Ans: Fast way to update count by 1.

What does this code block display?

int count = 0;
while(count < 6){
    cout << count << endl;
    count++;
}
	0
	1
	2
	3
	4
	5

What does this code block display?

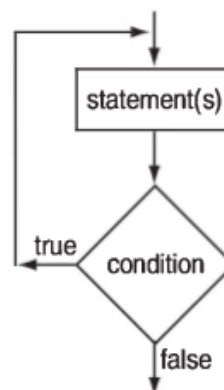|	

int num = 1;
while(num <= 5){
    cout << setw(4) << num;
    cout << setw(6) << num*num<< endl;
    num++;
}
	1 1
	2 4
	3 9
	4 16
	5 25

Sentinel Controlled Loop

What does this code block display after the following values are entered: 3 7 1 2 -1?

int sum = 0;
double average = 0;
int count = 0;
int score;
cout << "Enter a score (-1 to quit):   ";
cin >> score;
while(score != -1){
    sum += score;
    cout << "Enter a score (-1 to quit):   ";
    cin >> score;
    count++;
}
average = static_cast<double>(sum) / count;
cout << "Average: " << average;
	3.75

Do-While Loop

What will each of the following program segments display?

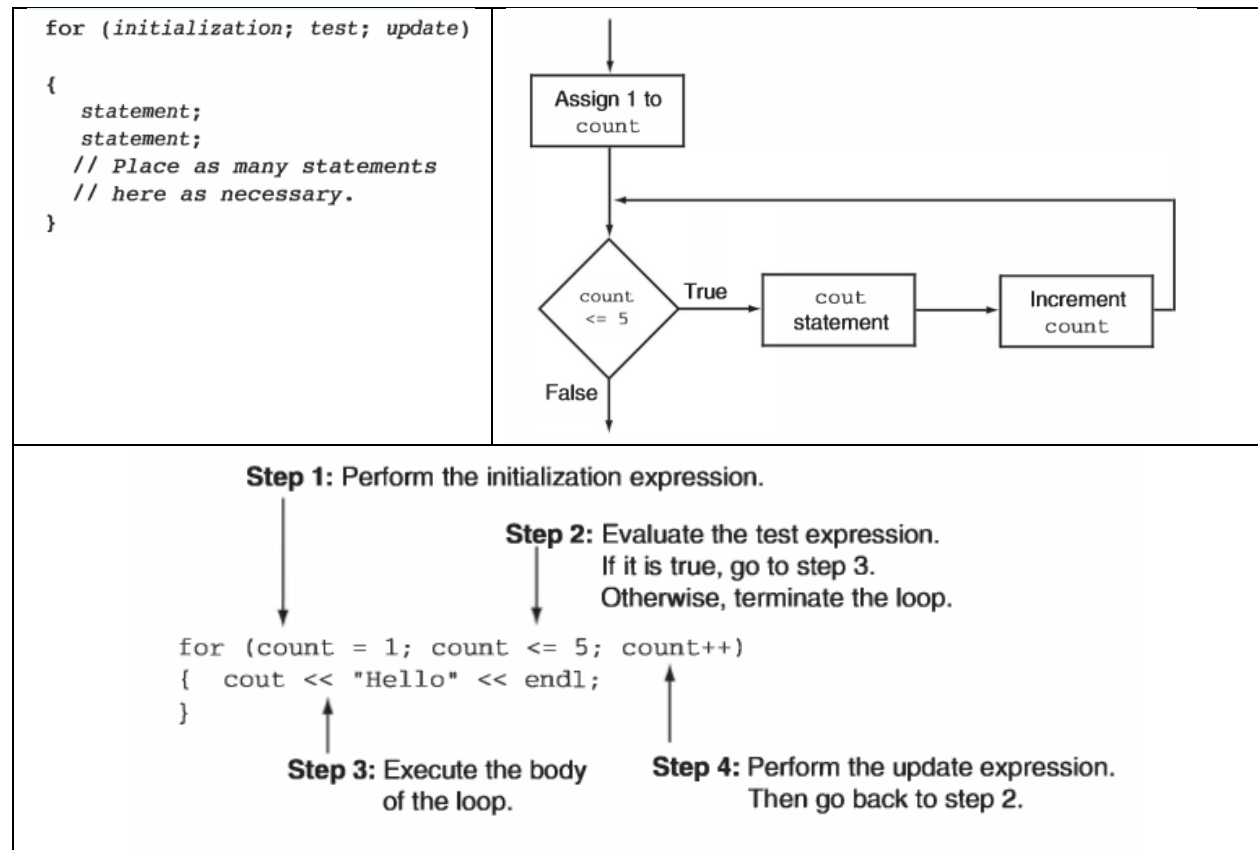|	

A) int count = 3;
   do {
          cout << "Hello World\n ";
          count--;
    } while (count < 1) ;
	Hello World

B) int val = 5;
   do {
          cout << val << " ";
    } while (val >= 5);
	5 5 5 5 5 5 5 5....
	
	Infinite loop

C) int count = 0, number = 0, limit = 4;
   do {
          number += 2;
          count++;
    } while (count < limit);
    cout << number << " " << count << endl;
	8 4

Write a program segment with a do-while loop that displays whether a user-entered integer is even or odd. The code should then ask the user if he or she wants to test another number. The loop should repeat so long as the user enters Y or y. Use a logical OR operator in the do-while loop test expression.

Ans:
```
int number;
char choice;
do
{
        cout << "Enter a number:';
        cin >> number;
        if (number % 2 == 0)
                cout << "Number entered is even";
        else
                cout << "Number entered is odd"
cout << "Want to enter another number (Y or N)? ";
cin >> choice;
}
while(choice == 'Y' || choice = 'y');
```

The For Loop

```
for (initialization; test; update)

{
    statement;
    statement;
    // Place as many statements
    // here as necessary.
}
```

Assign 1 to count

count <= 5 | True → cout statement → Increment count

False

Step 1: Perform the initialization expression.

Step 2: Evaluate the test expression.
If it is true, go to step 3.
Otherwise, terminate the loop.

```
for (count = 1; count <= 5; count++)
{   cout << "Hello" << endl;
}
```

Step 3: Execute the body of the loop.

Step 4: Perform the update expression. Then go back to step 2.

What three expressions appear inside the parentheses of the for loop's header?

Ans:
1.) initialization express (the declaration and starting value of the loop counter)
2.) test expression (the condition that will stop the loop)
3.) update expression (the statement that increases or decreases the counter)

You want to write a for loop that displays "I love to program" 50 times. Assume that you will use a counter variable named count.

A) What initialization expression will you use?   Ans: int count = 1;

B) What test expression will you use?   Ans: count <= 50;

C) What update expression will you use?   Ans: count++

D) Write the loop.   **Ans:**
```
for (int count = 1; count <= 50; count++)
{
        cout << "I love to program";
}
```

What will each of the following program segments display?

A) for (int count = 0; count < 6; count++) cout << (count + count) << " ";	0 2 4 6 8 10
B) for (int value = -5; value < 5; value++) cout << value << " ";	-5 -4 -3 -2 -1 0 1 2 3 4

C) int x;
   for (x = 3; x <= 10; x += 3)
        cout << x << "   ";
   cout << endl << x;
	3 6 9
	12

Write a for loop that displays your name 10 times.

Ans:
```
for (int x = 1; x <= 10; x++)
        cout << "Mary ";
```

Write a for loop that displays all of the odd numbers, 1 through 49.

Ans:
```
for (int x = 1; x < 50; x += 2)
        cout << x << " ";
```

Write a for loop that displays every fifth number, 0 through 100

Ans:
```
for (int x = 0; x <= 100; x += 5)
        cout << count << endl;
```

In the following program segment, which variable is the counter and which is the accumulator?

```
int number, x = 0, y = 0, maxNums;
cout << "How many numbers do you wish to enter? ";
cin >> maxNums;
while (x < maxNums) {
```

```
        cout << "Enter a number: ";
        cin >> number;
        y += number;
        x++;
    }
        cout << "The sum of those numbers is " << y << endl;
```

Ans for counter: x

Ans for accumulator: y

Write a for loop that sums up the squares of the integers from 1 through 10 .

Ans:
```
for (int x = 1; x <= 10; x++)
{
        sum += x*x;
}
```

Write a for loop that sums up the squares of the odd integers from 1 through 9.

Ans:
```
for (int x = 1; x < 10; x += 2)
{
        sum += x*x;
}
```

Write a for loop that repeats seven times, asking the user to enter a number each time and summing the numbers entered.

Ans:
```
for (int x = 1; x <= 7; x++)
{
cout << "Enter a number: ";
cin >> number;
sum += number;
}
```

Nested For Loops

View this video: https://youtu.be/iN2DAYlQHQE

How many total stars will be displayed by each of the following program segments?

```
A) for (row = 0; row < 20; row++) {                     Ans: 600
        for (star = 0; star < 30; star++) {
            cout << '*';
        }
        cout << endl;
    }
```

B) for (row = O; row < 20; row ++) {   Ans: <mark>220</mark>
    for (star = O; star < 30; star++) {
        if (star > 10)
            break;
        cout << '*';
    }
    cout << endl;
}

What will the following program segment display?

int addOn = 0, subTotal = 0;
while (addOn < 5) {
    addOn++;
    if (addOn == 3)
        continue;
    subTotal += addOn;
    cout << subTotal << "   ";
}
	1 3 7 12

Writing data to a file

Write a code segment that creates an ofstream object named fout, opens a file named numbers.txt, and associates it with fout. The code should then use a loop to write the numbers 1 through 100 to the file before closing it.

Ans:
```
#include <fstream>
int main ()
{
        ofstream fout;
        fout.open ("C:\\numbers.txt");
        for(int x =1; x <= 100; x++)
        {
                fout << x << endl;
        }
fout.close();
cin.get();
return 0;
}
```

Reading data from a file

View this video:

Write a code segment that creates an ifstream object named fin, opens the numbers.txt file created by the code in the previous question, and associates it with fin. The code should then use a loop to read and display all of the numbers in the file before closing it.

Ans:

```cpp
#include <fstream>
int main (){
int nums;
ifstream fin;
fin.open("C:\\numbers.txt");
while(fin >> nums){
        fin >> nums;
        cout << nums << endl;
}
fin.close();
cin.get();
return 0;
}
```