Repetition Structure

(CS 1002)

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do loop

do loop

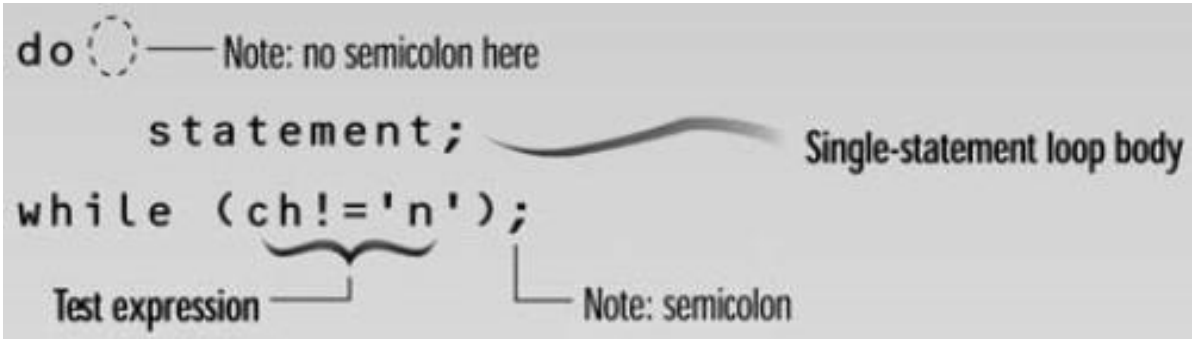
- In **while loop** if **condition is false** it is **never** entered or **executed**

- Sometime, **requirements** are that the **loop should be executed at least once**….

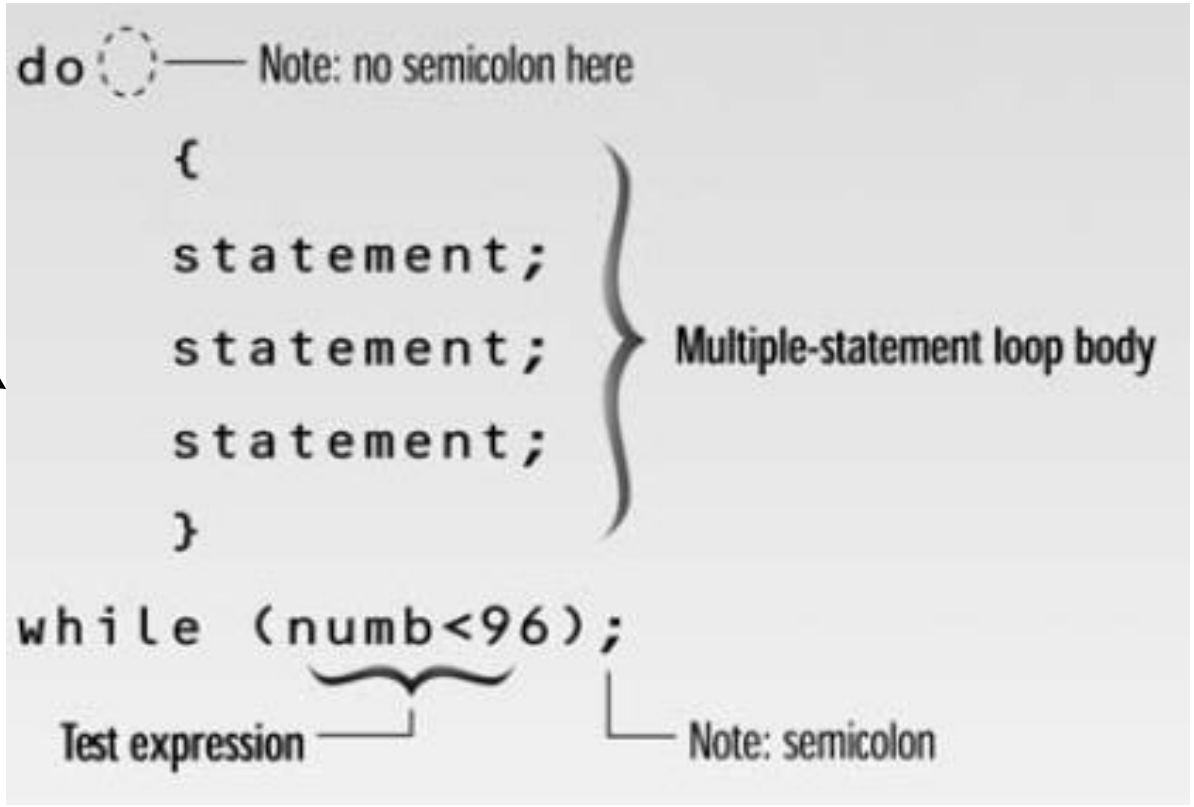
- For that, we use **do loop,** that **guarantees at least on execution of the loop body**

do while loop - Syntax

Loop body contain single statement



Loop body contain Multiple statement



do loop – Example1

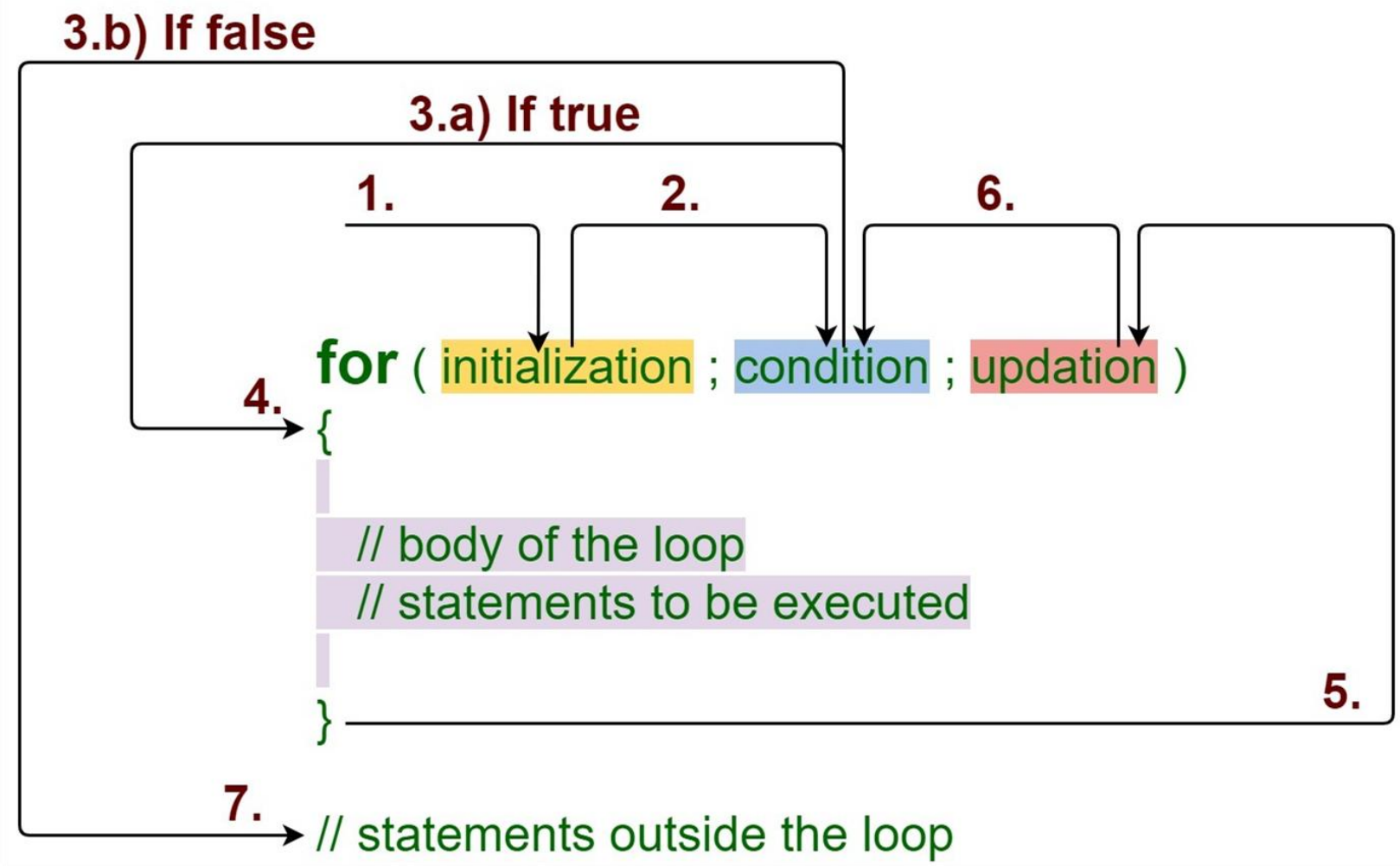
```
int main( )
{
  int counter, howmuch;
  cin>>howmuch;
  counter = 0;
  do {
          counter++;
          cout<<counter<<endl;
  } while ( counter < howmuch);

  return 0;
}
```

do loop – Example2

```
int main( )
{
   int num1, num2; char ch;
   do {
          cout<<“\nEnter a number:”;
          cin>>num1;
          cout<<“\nEnter another number:”;
          cin>>num2;
          cout<<“\nTheir sum is: “<<num1+num2;
          cout<<“\nDo another time (y/n):”;
          cin.get(ch);
   } while(ch==‘y’);
   return 0;
}
```

for Loop



https://media.geeksforgeeks.org/wp-content/uploads/20191108131134/For-Loop.jpg

for Loop - Example


```
for (int j=0;  j<10;  j++)
    cout << j * j <<endl;
```

(for loop) -- Class Exercise-2

Write a program that ask the user to enter a number. The program should print the table of that number (up to 10 values). Example…

Enter a number: 7

7 x 1 = 7
7 x 2 = 14
7 x 3 = 21
7 x 4 = 28
7 x 5 = 35
7 x 6 = 42
7 x 7 = 49
7 x 8 = 56
7 x 9 = 63
7 x 10 = 70

(for loop) -- Class Exercise-1

- Get a **number** from **user** and **calculate its factorial**

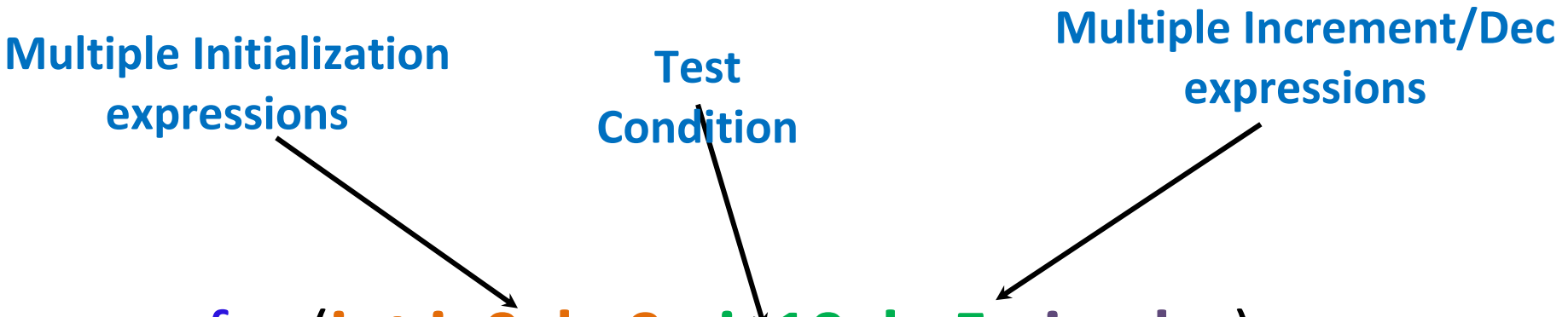
(for loop) -- Class Exercise-3

- Write a program that asks the user to enter two numbers (multiple of 10): ***speed1***, and ***speed2*** representing speeds in KPH (Kilo meters per Hour). Then the program should convert and show table of speeds in MPH (Miles per Hour) for all the speed values between ***speed1*** and ***speed2***.

MPH = KPH * 0.6214

speed1 and ***speed2*** variables should be multiple of 10. Each table entry (in KPH) should be updated by 5 in each iteration.

for loop – Multiple Expressions




```
for (int j=0, k=9;  j<10, k>5;  j++,k--)
{       cout << j * j <<endl;
        cout<< k*k <<endl;
}
```

(1) for loop – Multiple Expressions

```
int i, j;
for(i=1,j=2; i<=3,j<=12; i++,j=j+2)
    cout<<"\n i:"<<i<<", j:"<<j;
```

Output?

```
i:1, j:2
i:2, j:4
i:3, j:6
i:4, j:8
i:5, j:10
i:6, j:12
```

(1) for loop - Variable Visibility

```
int main()
{
      // int j;
      for(int j=0; j<10; j++) {
            int k = j*j;
            cout<<"\nValue of k: "<<k;
      }
      // j = 23; cannot do this!
      return 0;
}
```

(1) for loop – optional expressions

```
int j=0;
for(; j<10; j++)
        cout<<“\nHello world“;
```

```
int j=0;
for(; j<10;)
{
    cout<<“\nHello world“;
    j++;
}
```

```
for(; ;)
  cout<<“\nHello world“;
```

Infinite loop
(it never terminates)

for loop

```
int i = 10;
for(cout<<“Starting…”;i;cout<<i<<endl)
--i;
```

Output?

```
starting...
9
8
7
6
5
4
3
2
1
0
```

break Statement

- **`break`** statement
  - Immediate exit from **`while`**, **`for`**, **`do/while`**, (also used in **`switch`**)
  - **break immediately ends** the **loop** that contains it.

- **Common uses:**
  - **Escape early** from a loop
  - **Skip remainder part of the loop and exit**

break Statement - Examples

```
for (int i=1; i<=5; i++)
{
      if (i==3)
            break;
      cout<<“Hello”;
}
```

```
int n;
int EvenSum=0;
while(1)
{
    cin>>n;
    if(n%2==1)
        break;
    EvenSum = EvenSum + n;
}
```

(using break in loops) – Class Exercise 1

- Write a program which reads an integer ***n*** from the user, and prints square value (***n*n***) for that number. Whenever ZERO is entered by the user program should terminate by printing “Invalid Value” message.

continue Statement

- **`continue statement`**
  - **Only ends the current iteration**
  - **Skips remainder of loop body** (in **current iteration**)
  - **Proceeds** with **next iteration** of **loop**

- **"continue"** can only be inside loops (***for***, ***while***, or ***do-while***). **IT CANNOT BE USED IN *"switch"***

continue Statement - Examples

```
for (int i=1; i<=5; i++)
{
      if (i==3)
            continue;
      cout<<“Hello”<<i;
}
```

```
int n;
  int EvenSum=0;
   while(1)
  {
            cin>>n;
            if(n%2==1)
                  continue;
            EvenSum = EvenSum + n;
  }
```

Nested Loops

- **Loops can be nested in interesting ways**
  - Draw rectangle, triangle, etc.
  - Display all numbers which are _____ (prime, perfect square, etc.)
  - Show all 2-digit numbers whose digits add up to a number which is a multiple of 6

Dry Run + Debugging

- **Debugger**
  - Can be used gdb with instructions
  - Easy to use in IDEs
  - Demo

Any Questions!