

Computer programming II CSC 202

Assignment

What is loop Invariant?

Loop Invariant: This is the algorithm that help to understand the correctness of any algorithm element.

Explain loop Invariant In line of the following

i Initialization

ii Maintenance

iii Termination

a. Initialization: In loop Invariant it is true prior to the iteration of the loop. It is the first iteration that hold the loop Invariant.

b. Maintenance: This is the next loop Invariant if it is true before an iteration of the loop. It remains true before an iteration of the loop. It remains true because the next iteration

c. Termination: Finally, when the loop terminate, the condition cause that loop to terminate is that when the loop to terminate is that when the loop terminate, the Invariant gives us a useful property that helps show that algorithm is correct.

To show the correctness of any algorithm Use loop Invariant Using C++ program implementation.

```
#include <iostream>
```

```
using namespace std
```

```
//insertion sort
```

```
int main
```

```
{ int *insertion (int *a, int n)
```



```

int i;
int Key;
for (int i; i < n; i++)
{
    Key = A[i]
    i = j - 1
    while (i > -1 && A[i] > Key)
    {
        A[i+1] = A[i]
        --i;
    }
    A[i+1] = Key;
}
return A;
}

```

```

// main function
int main ()
{
    int A[] = {65, 63, 12, 45, 9, 3, 33, 1, 13, 4, 5}
    InsertionSort(A, 10); // Sort the Array
    // Output the Content of Sorted Array
    for (int i = 0; i < 10; i++) cout << A[i]
    << endl;
    return 0;
}

```