**Exercise 1: find the max element in an array**

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **23** | **65** | **12** | **87** | **12** | **343** | **098** | **12** | **76** | **312** |

* **Pre-Condition:**
  + - A variable **c** stores the values in the array
    - A variable **maxi** store the First index in array
    - I want compare the whole array index with first index to find the maximum value
* **Post-Condition:**
  + - After the Loop termination ,the values of **c** must be compare with the value in variable **maxi** and print the greatest one in the array.
* **Loop variant:**
  + - The loop should be terminate once the values in variable **c** is greater than the variable **maxi.**
* **Loop invariant:**
  + - In the iteration, I initialize the variable **i=1** and give the condition **(i<c. length).**
    - In for loop the variable **i** should be incremented.
    - Using if condition the values in the **c** compared with the value in **maxi.**Once it reached end of array the maximum value should be printed.
    - After the ith iteration, the variable **maxi** provide the greatest value in an array.

Pseudocode:

Class Maxi{ {

int[] c = {23,65,12,87,12,343,98,12,76,312};

int maxi = c[0];

for (int i = 1; i < c.length; i++) {

if(c[i]>maxi);

{

maxi = c[i];

}

}

System.*out*.println(maxi)

}

}

**Exercise 2: Move zeroes to the end of Array**

* Pre-condition:
  + - I need to take three variables (i.e a,n,c).
    - In variable a I can store array values.
    - Initialize i=0 and assume values for variables c is 0.
* Post Condition:
  + - After the first loop termination,the values of a[i] must be check that i values are not equal to zero.
    - Not equal to zero values are get in on while loop and stored in variable k.
* Loop Variant:
  + - The loop should terminate after checking all i values with a[i] upto a.length(i<a.length).
* Loop Invariant:
  + - Before the iteration of loop,variables c is 0.
    - After the iteration I gave one if condition i.e.,(a[i] != 0).
    - Result of if condition should be stored in variable c.
    - Using foreach loop I combined the results of if and while condition by adding another variable i.e, k.

Pseudocode:

public class Zerooo {

public static void main(String[] args) {

{

int a[]= {8,0,3,0,7,1,0,78};

int n= a.length;

int c=0;

for (int i = 0; i < a.length; i++) {

if (a[i]!=0) {

a[c++]=a[i];

}

}

while (c<a.length) {

a[c++]=0;

}

for(int k : a) {

System.*out*.print(k+"");

}

}

}

}

**Exercise 3:**

**Convert Roman Numbers into Integers**

**Pre-condition:**

* First, I need two method(i.e. **Input** and **output**).
  + - In Method **Input** I store the corresponding integer and roman number.
    - In Method Output I used to iterate the loop and give some conditions.
* After that, I define variables(i.e. v, t and s)

Variable v is used to define the roman numbers , I initiate the variable t=0 and i=0

**Post condition:**

* After the loop termination the values s1 and s2 checking the greater and lesser than both. Thus, result should be stored on variable **t**
* Using if else condition the greater one should be added and printed.

**Loop variant:**

* The loop should terminate after the variable i reached given limit(i.e. i<s.length)

**Loop invariant:**

* Before the iteration of loop,variable **t** must be equal to zero
* After the iteration I create variable s1 and s2 for comparing process.
* Using IF ELSE condition I give two condition (i.e. t=t+s1 and t=t-s1)and print the greater one.
* Finally by creating main method and object creation I call the corresponding number for Roman numbers.

**Pseudocode:**

public class MyRoman {

public static int input(char v) {

if (v == 'I')

return 1;

if(v=='V')

return 5;

if(v=='X')

return 10;

if(v=='L')

return 50;

if(v=='C')

return 100;

if(v=='D')

return 500;

if(v=='M')

return 1000;

return 0;

}

private static int output(String s) {

int t = 0;

for (int i = 0; i < s.length(); i++) {

int s1= s.charAt(i);

if( s1>= s.length())

{

int s2= *input*(s.charAt(i+1));

if (s1 >= s2) {

t=t+s1;

}

else

t=t-s1;

}

else {

t=t+s1;

}

}

return t;

}}