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

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

**Pseudo Code:**

**array[] = {23 ,65,12,87,12,343,98,12,76,312};**

**Initialize variable int max =a[0], i=0;**

**WHILE ‘i’ is less than given array.length**

**If a[i] is greater than max**

**max = a[i];**

**i++; “Add Increment operator”**

**print result (max) “Inside the While Loop”;**

**ALGORITHM:**

* **Pre-condition:** 
  + Declare Two Variables ‘**i**’ and ‘**max**’.
    - A variable **’i’** that acts as a loop counter.
    - A variable **max** usedto store the index values and used to store biggest element of a given array.
    - Initialise **max=a[0]** *(Initialize max with first element of array).*
    - **i = 1** *(Where iteration starts from 1 with condition using* ***While Loop****)*
    - Compare each elements of array with **max** using **if condition.**
* **Post-Condition**
* Continue this process until the end of the array is reached. At the end of the loop, **max** will hold the biggest element in the array.
* **Loop variant**
  + The loop should terminate until the given condition **a[i]** become greater then **max** and it compares each elements of an array and finds max element in an array.

i.e. **if a[i]>max.**

* **Loop invariant** 
  + During Initial process of **while loop**, which checks the condition to be true **( i < a.length )** for the next iteration**.**
  + In **if condition**, it compares each index values with **max** to find maximum element in an array and loop will gets terminated.
  + After the **i**th iteration, the loop holds true for elements of array A[] and Although it can temporarily be false during the body of the loop.

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

**Arr[] = {3,0,5,4,0,2,2}**

**Pseudo Code:**

**Initialize count=0**

**Create function pushZeroToEnd(array,n)**

**for i in 1 to array.length**

**if array element is not equal to 0**

**array[count]=element**

**count=count+1**

**for j in count to array.length**

**array[count]=0**

**count=count+1**

**function Void Main**

**for i in 1 to array.length**

**Print (arr[i])**

**ALGORITHM:**

* **pre-condition:**
* Make a function named**pushZeroToEnd** and input an array.
* Initialize array **arr[]={3,0,5,4,0,2,2}, and array size n=7.**
* Intialize **Count=0.**
* Apply for loop and Initialize **i=0 & j=0.**
  + - Apply **if condition to check the element arr[i] is not equal to zero.**
    - **Arr[i]** usedto print index values.
* **Post-condition:**
* A **pushZeroToEnd** function can perform certain operation to move all zeros to the end of array. Which also performs two for loop operations.

**(** i.e: **i=0;i<arr.length;i++} & (** i.e: **j=count;j<n;j++)**

* After loop termination, Results will be printed on main method.

i.e: **print(arr[i]) =**  **{3,5,4,2,2,0,0}**

* **Loop variant:**
* A function named **pushZeroToEnd** and input an array. Which Traverse through the array and **check** each **element whether it is equal to zero or not.**
* If the element is **not equal to zero**, put the element at the **count’th position** of the array. **( i.e: arr[i]!=0 )**
* Increase the value of count by 1 ( i.e: **count++ / count+1)** and stores and pushes elements like **{3,5,4,2,2..}**
* At last, fill the remaining positions of the array with 0.
* **Loop invariant:**
* Function named**pushZeroToEnd**can called by inside of main method. Under For loop condition those stored values **{3,5,4,2,2..}** compared with array size 7. **(** i.e: **i=0;i>7;i++)**
* Then the results will be printed on console.