Name______Kan Katpark__________ID______642115003_____Group_____________________

Tutorial 4 Algorithm Efficiency and Midterm review

1. What is the big-O of the following snippet

1.1

```
int result = 0
     int i = 1
while i < n
      if n % i == 0
          result += i
      end
i += 1
end
return result
```

O(n)

1.2

```
if array[0] == null
  return true
else
  return false
end
```

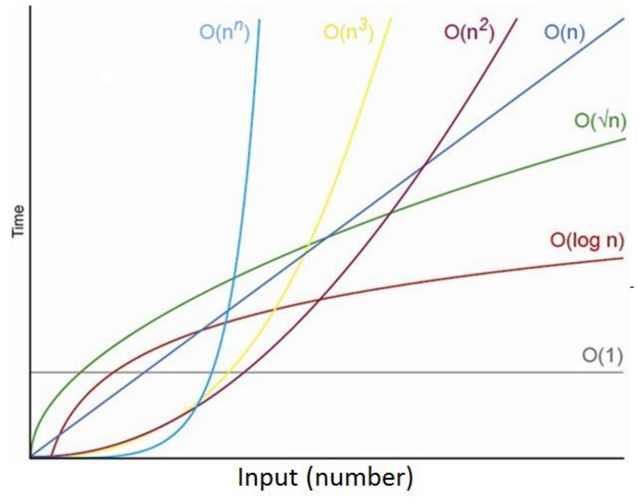
O(1)

1.3

```
public static int doSomething(int[] arr, int x){

      int size = arr.length;
      for(int i=0;i<size;i++){
         if(arr[i] ==x){
            return i;
         }
      }
      return -1;
   }
```

O(n)



1.4 According to above comparison figure, which function represents the fastest algorithm?

O(1)

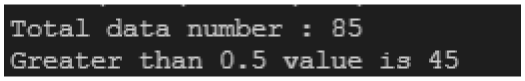
2. Write a Java program that read a data file (you can download from the link here https://www.dropbox.com/s/chnpp0kkvpbbyfb/data.txt?dl=0

Your program must have a method call “mySearch” which responses to find for all the value in the given data file that are greater than 0.5. Below is an example output of the program from a different data file.

```
>Total number of values read: 15103
>Number of value > 0.5 is: 1343
```

What is the Big O of your method mySearch?

n + n log n



```
Total data number : 85
Greater than 0.5 value is 45
```

Working process

Read data -> sort data with quick sort -> create sub array of data starting with index of last number that smaller than 0.5 to end of array -> display sub array size

Copy and paste your java source code here

```
import java.util.*;
import java.io.*;

public class MySearch {
   public static void main(String[] args) {

      String location = "data.txt";
      File file = new File(location);

      Vector<Double> data = new Vector<Double>();
      readData(data, file);
      System.out.println("Total data number : " + data.size());

      quickSort(data, 0, data.size());

      int index = search(data, 0.5 );

      Vector<Double> greaterThanTarget = new Vector<Double>(data.subList(index,data.size()));

      System.out.println("Greater than 0.5 value is "+ greaterThanTarget.size());

   }// end main
```

```
public static int search(Vector<Double> data , double target) {
   for(int i = 0 ; i < data.size() ; i++){
      if(data.elementAt(i) > target) return i ;
   }
   return 0 ;
}// end search

public static void quickSort(Vector<Double> data, int l, int r) {
   if (l >= r)
      return;

   int part = partition(data, l, r);
   quickSort(data, l, part);
   quickSort(data, part+1, r);
} // end quick sort

public static int partition(Vector<Double> data, int l, int r) {
   int i = l - 1;
   double pivot = data.elementAt(r - 1);

   for (int j = l; j < r - 1; j++) {
      if (data.elementAt(j) < pivot) {
         i++;
         swap(data, i, j);
      }
   }

   swap(data, i + 1, r - 1);
   return i + 1;
} // end partition

public static void swap(Vector<Double> data, int i, int j) {
   double temp = data.elementAt(i);
   data.set(i, data.elementAt(j));
   data.set(j, temp);
} // end swap
```

```
    public static void readData(Vector<Double> data, File file) {
        try {
            Scanner sc = new Scanner(file);

            while (sc.hasNextLine()) {
                double num = Double.parseDouble(sc.nextLine());
                data.addElement(num);
            }

        } catch (FileNotFoundException e) {
            System.out.println(e);
        }
    }
} // end read data
```