Timothy Zwart

Assignment 6 Cmpt435

Minmax

**Date Assigned: 10/05/2018**

**Due: Midnight 10/12/2018 on iLearn**

**Please read turn-in checklist at the end of this document before you start doing exercises.**

**Section 1: Pen-and-paper Exercises**

1. We are given an array of n numbers A in an arbitrary order. Design an algorithm to find the largest and second largest number in A using at most 3/2n -2 comparisons.
2. **describe the idea behind your algorithm in English (5 points);**
   1. if n is odd then start max and second max as the first element. If n is even then start max and second max as max as max and second max of the first 2 elements. For rest of the elements pick them in pairs and compare their respective max and mins. If A[i] > A[i+1] make Max equal to the largest number compared to it self and the number set. If max was changed to a new number then replace 2max value with the value of max previously. Then compare 2max to the remaining value. If A[i] < A[i+1] make Max equal to the largest number compared to it self and the number set. If max was changed to a new number then replace 2max value with the value of max previously. Then compare 2max to the remaining value.
3. **provide pseudocode (10 points);** 
   1. Int 2max;

Int max;

Int i

If (n/2 is int){

If (A[0] > A[1]){

2max = A[0];

Max = A[1];

}else{

2max = A[1];

Max = A[0];

}

Int =2;

}else{

2max = A[0];

Max =A[0];

I=1;

}

while(I<n-1){

if(A[i] > A[i+1]){

if(A[I] > max){

2max = max;

max = A[I]

}

If(A[i+1] > 2max ){

Max = arr[i+1]

}

}else{

if(A[I+1] > max){

2max = max;

max = A[I]

}

If(A[i] > 2max ){

Max = arr[i+1]

}

}

I+=2;

}

Return Min and max

}

1. **analyze the number of comparisons used in your algorithm (5 points).**
   1. If n is odd: 3\*(n-1)/2
   2. If n is even: 1 initial comparison min and max and 3(n-2)/2 compare for the rest of the elements = 1 + 3\*(n-2)/2 = 3n/2 -2

**Full credit (20 points) will be awarded for an algorithm that uses at most 3/2n -2 comparisons. Algorithms that make more comparisons will be scored out of 5 points.**

**TURN-IN CHECKLIST:**

1. **Answers to Section 1 (.doc/.txt). Remember to include your name, the date, and the course number in comments near the beginning of your code/report.**
2. **Create a folder and name it 'FirstName\_LastName\_assignment\_6'. In the newly created folder copy and paste your files (.doc/.txt/.java files). Then compress the folder, and submit to iLearn.**