Week 5 - Recursion

5.1 Pre-Homework

1. A program that works out the distance between two points using the pythagorus theorem. (In Java)

public static double pyDO(int x1, int y1, int x2, int y2){

return Math.sqrt( ((x2-x1)\*(x2-x1)) + ((y2-y1)\*(y2-y1)) );

}

5.2 Homework

1. Search for values in a given range (Unsorted) pseudocode.

BOOL DO\_THING\_UNSORTED(A,U)

for i ← to Length(A)

if A[i] > 1 && A[i] > U

return true

return false

1. The Algorithm’s time complexity in Big(O) notation = On

1. Implemented in java

public static boolean DO\_THING\_UNSORTED(int[] A, int u){

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

{

if(A[i] > 1 && A[i] < u)

return true;

}

return false;

}

1. Pseudocode of Sorted algorithm

BOOL DO\_THING\_SORTED(A , U, START, MID)

tmp ← (start + mid)/2

ifA[tmp] greater than U

return flase;

if A[tmp] less than U

mid = mid/2

DO\_THING\_SORTED(A, U, START,MID)

ELSE IF A[tmp] greater than 1

return true

else

return false

return true

4a) Sorted Algorithm’s time complexity in Big(O) notation:

O(log n).

4b) Sorted algorithm implementation in java

public static boolean DO\_THING\_SORTED(int[] A, int u, int start, int mid){

//tmp holds midpoint of current array range

int tmp = (start + (mid)/2);

//if element == u then check against criteria.

if (A[tmp] == u ){

return false;

}

//if u > midpoint, check lower half.

if (A[tmp] > u) {

mid = mid / 2;

DO\_THING\_SORTED(A, u, start, mid-1);

}

//if midpoint is less than range, check if meets criteria.

else if (A[tmp]>1)

return true;

else return false;

return true;

}

}