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CMSC 451

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**Homework 2**

1) Prove

=

= now reduce common factor n =

This shows as the limit approaches infinity the value approaches infinity, therefor f(n) grows faster than g(n), .

Prove

=

= now reduce common factor n =

This shows as the limit approachs infinity the value approaches 0, therefor g(n) grows slower than f(n),

2) 2

3

4n + 10

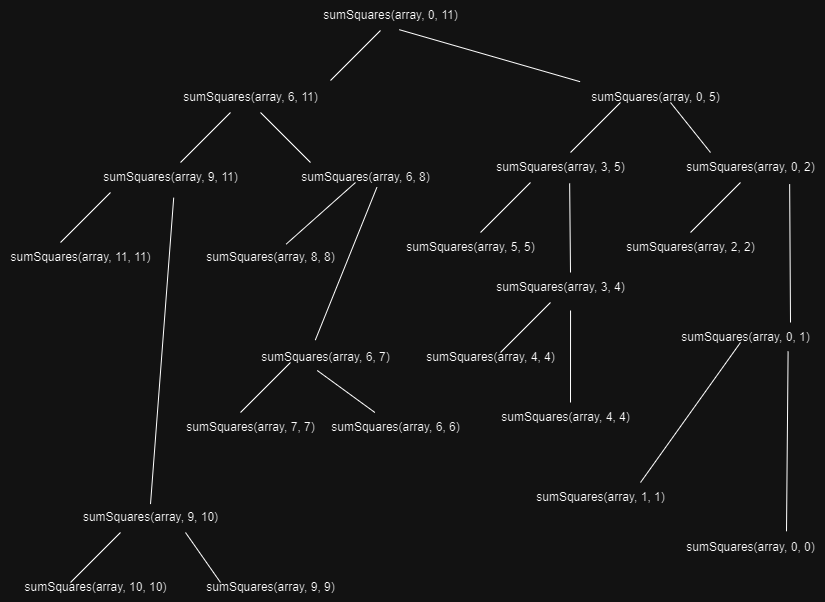
3n

2n2 + 10n + 5 n2 + 6n

2n3 + n2 + 6

2n

4n

3) 

Height of the tree is given by

Sum of the nodes can be expressed as a summation: = = 2n – 1

Big for memory is

Execution time for t(n) =

Iterative solution: int sumSquare(int[] array)

Int sum = 0

For ( i = 0 to array length)

Sum += array[i] \* array[i]

Return sum

Execution time for iterative approach, t(n) =

Big for Memory is

Though both approaches have the same execution time, the iterative approach uses less memory and is therefor better than the recursive approach.

4) The recurrence equation looks as follows: t(n) =

Initial condition: t(1) = 1

The recurrence tree work will be: Root level = t(n)

Level 2 = 2 \* t(

Level 3 = 4 \*

Level = n \* t(1)

The critical exponent will be: where the branching factor, b, is 2 and the cutting factor, c, is 2. Therefor

Using part 1 of the Little Master’s Theorem t(n)

Because this is a sum of squares problem, each element must be visited at least one time, which makes a execution time to be optimal.