# Hw1

Saturday, January 25, 2020 5:52 PM

Q1. assume FindMax does not find max.

then result does not find largest value in inputs.
however, if (n > result) → result = n
∴ findmax returns max

Q2.

Github: https://github.com/brunersj

Stackoverflow: https://stackoverflow.com/users/12795131/brunersj

Q3 time complexity:

Sort: O(nlogn)
to determine median: O(1)
∴ Find median: O(nlogn)

added test cases and checked in.

Q4. -f (forcefully) removes file not up to date with latest commit. This prevents erroneously removing a locally edited file.

-r removes files recursively

Q5.
a) 1st for loop: log n
2nd for loop: n
O(n log n)

i = 8
i = 4
i = 2
i = 1
i = 0

b) O(log n)

Q6)
1. a) function returns -1 when n<0.
However, input validation exists such that the user cannot input an invalid number.

2. yes. See attached Cpp file.

4. Recursive runtime: O(n)
non recursive runtime: O(n)

5. non recursive proof:

let P(n) be the non recursive function.
show P(n) is true ∀ n ≥ 0

Base: n = 1 n! = 1 $n! = n(n-1)(n-2)\cdots 2\cdot 1$

IH: $P(n+1) = (n+1)!$

IS $P(n+1) = (n+1)n!$

$= (n+1)\,n(n-1)(n-2)\cdots 2\cdot 1$

$= (n+1)!$

QED