

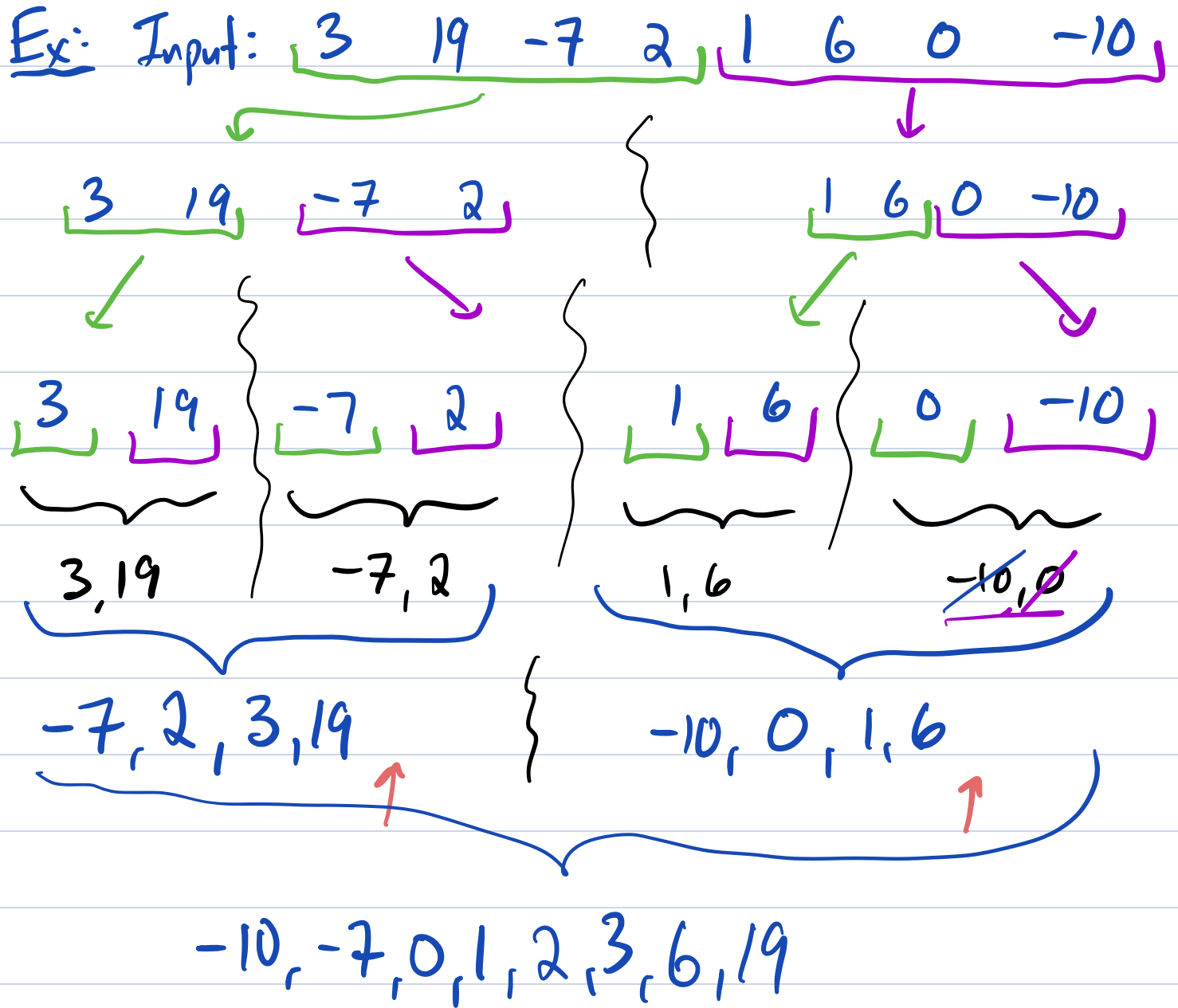
Fri, Feb 23, 2024
Scientific Computing

①

Announcements:

- HW 2 due tonight
- HW 3 assigned today, due Fri, March 8
- Wed March 6: In-class midterm
Take-home assigned
- Fri March 8: Office hours instead of
lecture
- * Spring Break *
- Wed, March 20: Take-home due
- Monday, April 1: No lecture,
home work day
- Monday, April 8: Solar Eclipse
no in-person lecture

Topic 6 - Divide + Conquer (continued)



Pseudocode

function merge_sort(Q): # Q is a list of numbers
if $|Q|=1$:

return Q

L = left half of Q

L = [3]

R = right half of Q

R = [19]

L = merge_sort(L)

} sort each half individually, recursively

R = merge_sort(R)

L = [3]
R = [19]

new_list = []

while $|L|+|R|>0$:

[take $L[0]$ or $R[0]$, whichever is smaller, remove it, and append it to new_list

return new_list

How the computer does this:

merge_sort([3, 19, 2, -7])

↳ merge_sort([3, 19]) (L)

↳ merge_sort([3]) (L)

returns [3]

↳ merge_sort([19]) (R)

returns [19]

combines + returns [3, 19]

↳ merge_sort([2, -7]) (R)

↳ merge_sort([2]) (L)

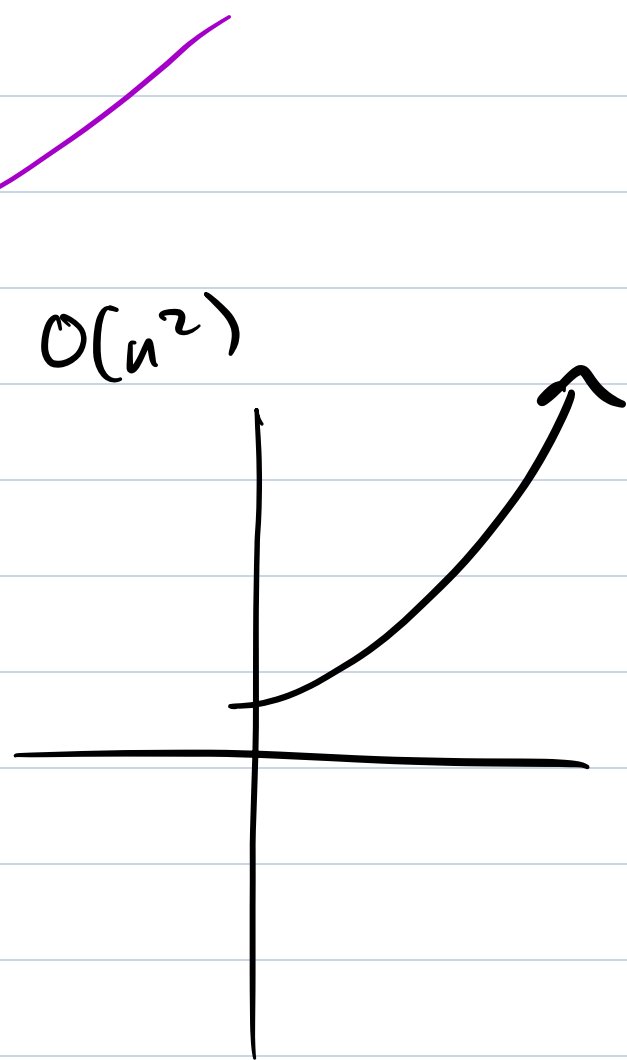
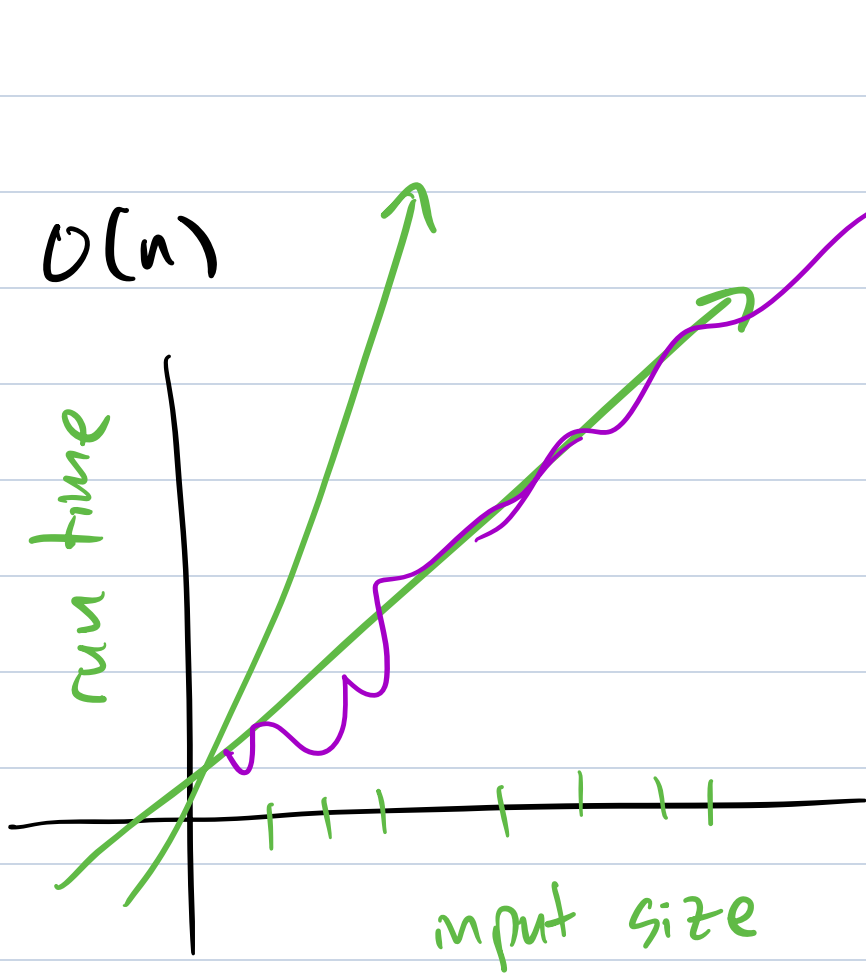
returns [2]

↳ merge_sort([-7]) (R)

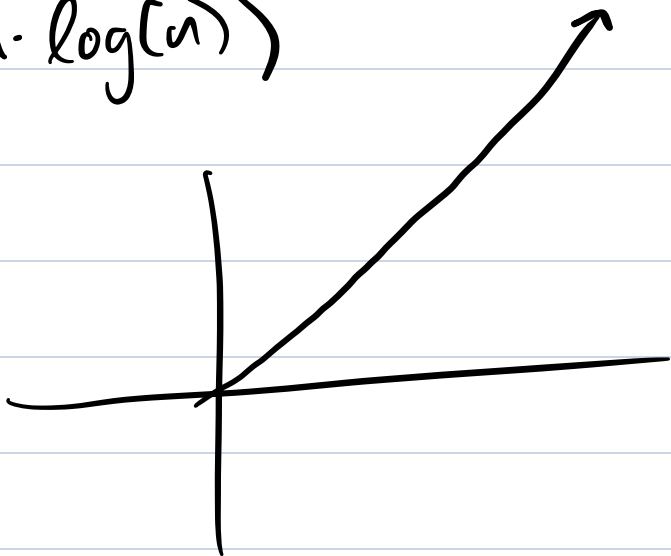
returns [-7]

combines + returns [-7, 2]

combines + returns [-7, 2, 3, 19]



$O(n \cdot \log(n))$



$O(\log(n))$

