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## Midwestern State University

Advanced Data Structures and Algorithms - Homework 3 - Fall 2021

This is an Individual Assignment

You must:

1. Print this document and solve your homework by hand (no computer solution accepted)
2. The homework **MUST** be solved in a clean, ordered, readable, presentable manner. Messy work will lose points, presentation is part of your grade. (For sure this will happen this time) (-5 points if not respected)
3. Add extra white pages if needed.
4. All your pages must be stapled together (-7 points if not respected)
5. Correct answers without proper explanation will not receive points.

Deliverables & Due Dates:

Scanned copy: Monday November the 1st, 2021 at 5:00 am. (OFFICIAL delivery date)

Hard Copy: Tuesday November the 2<sup>nd</sup>, 2021 at class time.

**BOTH MUST** be submitted to get full points, Hard copy delivery without scanned copy submitted to D2L will not be accepted and a grade of zero will be assigned.

Fawzy Alsedid

# [Counting Sort]

arr  $\rightarrow$  [ 100 213 22 11 54 5 726 367 278 69 ]

① Find range, max, and min

min = 5

max = 11

range [5, 726]

② Create array of element to count the # of appearances

v - value-number

a - # of appearances in lines

v	5	11	22	54	69	100	213	278	367	726
a	1	1	1	1	1	1	1	1	1	1
	1	1	1	1	1	1	1	1	1	1

③ add the # app. from Left (L) to Right (R) Accumulatively

v	5	11	22	54	69	100	213	278	367	726
value	1	1	1	1	1	1	1	1	1	1
index	1	2	3	4	5	6	7	8	9	10

④ Shift cumulative values to the right (R)

Value	5	11	22	54	69	100	213	278	367	726
Index	0	1	2	3	4	5	6	7	8	9

⑤ Proceed w 1st element in array then ⑥ move right to next element

100	213	22	11	54	5	726	367	278	69
5	11	22	54	69	100	213	278	367	726
[index]	0	1	2	3	4	5	6	7	8

a) (100) index is 5 then 213 index is 6 then 22 and index is 3 and so on

b) add +1 to index where # should be placed ex: 100 index is 5 so you add +1 which is going to be 6.

Fauzy AlSaud

[ Radix ]

100      213      22    11    54    5    726    367    278    69

ones ↓

① we sorted this way, tens, hundreds, thousands and so on...  
(NOTE we should add zeros an example 9 → 009)

100    213    022    011    054    005    726    367    278    069

[ ONES ]

0      1      2      3      4      5      6      7      8      9  
100    011    022    213    054    005    726    367    278    069

0      1      2      3      [ tens ]    4    5    6    7    8    9  
100    011    022    213    054    367    278    069

100, 005, 011, 213, 022, 726, 054, 367, 069, 278

↓  
[ hundreds ]

0      1      2      3      4      5      6      7      8      9  
005    100    213    367    726  
011  
022  
054  
069

so final answer after sorting

005, 011, 022, 054, 069, 100, 213, 278, 367, 726

\*remove zeros

[ 5    11    22    54    69    100    213    278    367    726 ]



Fuzzy Alband

# [Quick Sort]

↓  
100      213      22      11      54      5      726      367      278      69

is  $100 > 69$  then swap 100 with 278  
and move(p) to left

↓  
278      213      22      11      54      5      726      367      69      100

is  $278 > 69$  then swap and move

↓  
367      213      22      11      54      5      726      69      278      100

is  $367 > 69$  then swap and move

↓  
726      213      22      11      54      5      69      367      278      100

is  $726 > 69$  then swap and move

↓  
5      213      22      11      54      69      726      367      278      100

is  $5 > 69$  No then compare with  $j+1$

↓  
5      213      22      11      54      69      726      367      278      100

is  $213 > 69$  yes then...

↓  
5      54      22      11      69      213      726      367      278      100

↓  
5      54      22      11      69      213      726      367      278      100

$5 > 11$  No pass

↓  
5      54      22      11

$54 > 11$  yes...

↓  
5      22      11      54

$22 > 11$  yes then swap

5      11      22      54      69      100

5      11      22      54      69      100

is  $213 > 100$  then swap...

↓  
278      726      367      100      213

↓  
367      726      100      278      213

is  $367 > 100$  yes...

↓  
726      100      367      278      213

is  $726 > 100$  yes

↓  
726      367      278      213

is  $726 > 213$  yes...

↓  
278      367      213      726

is  $278 > 213$  yes...

↓  
367      213      278      726

is  $367 > 213$  yes

↓  
367      278      726

is  $367 > 278$  No Pass

(367 > 278) yes...

↓  
213      367      278      726

is  $213 > 278$  No Pass

↓  
213      367      278      726

Final answer

5      11      22      54      69      100      213      278      367      726