

Camps ID 1-29-08

EX. $n=6$

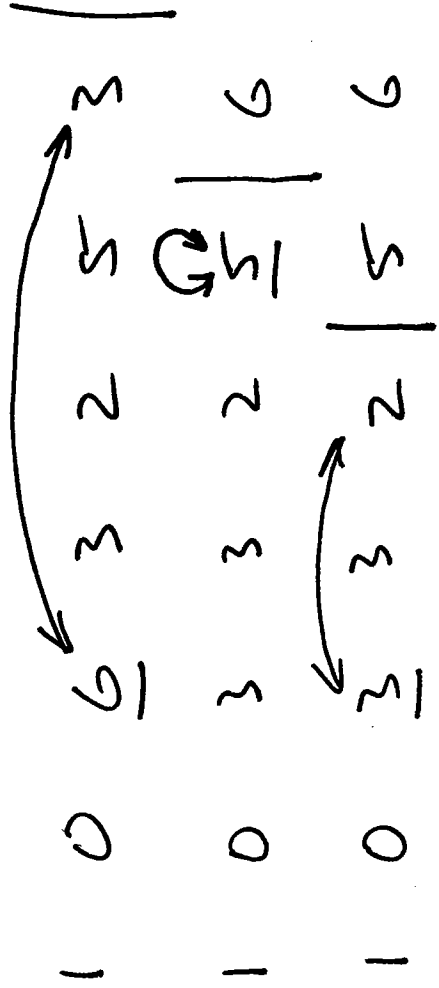
6 8 5 0 4 3

Donez !

2

INDEX OF RIGHTMOST

EX. $n=7$



R

4

1 0 2 3 | 5 6

1 0 2 3 | 5 6

1 0 2 3 | 5 6

0 1 2 3 | 5 6

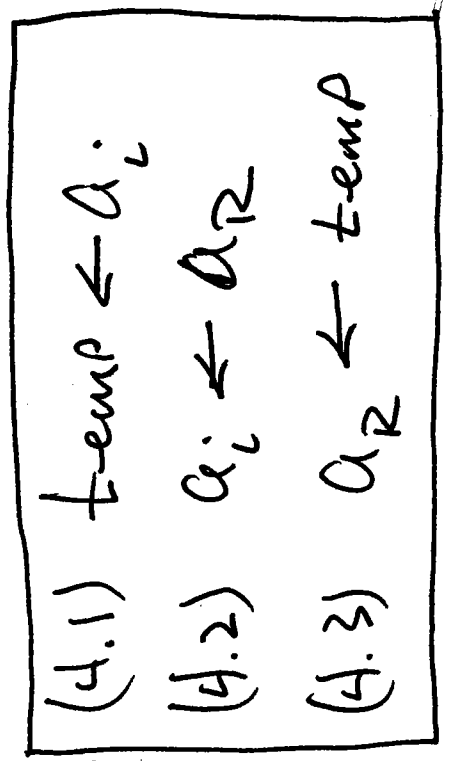
Selection Sort

INPUT: $n \geq 1, a_1, \dots, a_n$

OUTPUT: Modified list in increasing order

SELECTION SORT

- 1.) $R \leftarrow n$
- 2.) while $R \geq 2$
- 3.) find index i of maximum # in UNSORTED SECTION
- 4.) swap a_i with a_R
- 5.) $R \leftarrow R - 1$
- 6.) stop



REFINEMENT
OF STEP 4.

Ans 102: 1.) $a \leftarrow b$

2.) $b \leftarrow 7$

3.) $temp \leftarrow a$
 4.) $a \leftarrow b$
 5.) $b \leftarrow temp$

$\frac{a}{6} \quad 7$
 $\frac{b}{7} \quad 6$

$\frac{temp}{6}$

Another way:

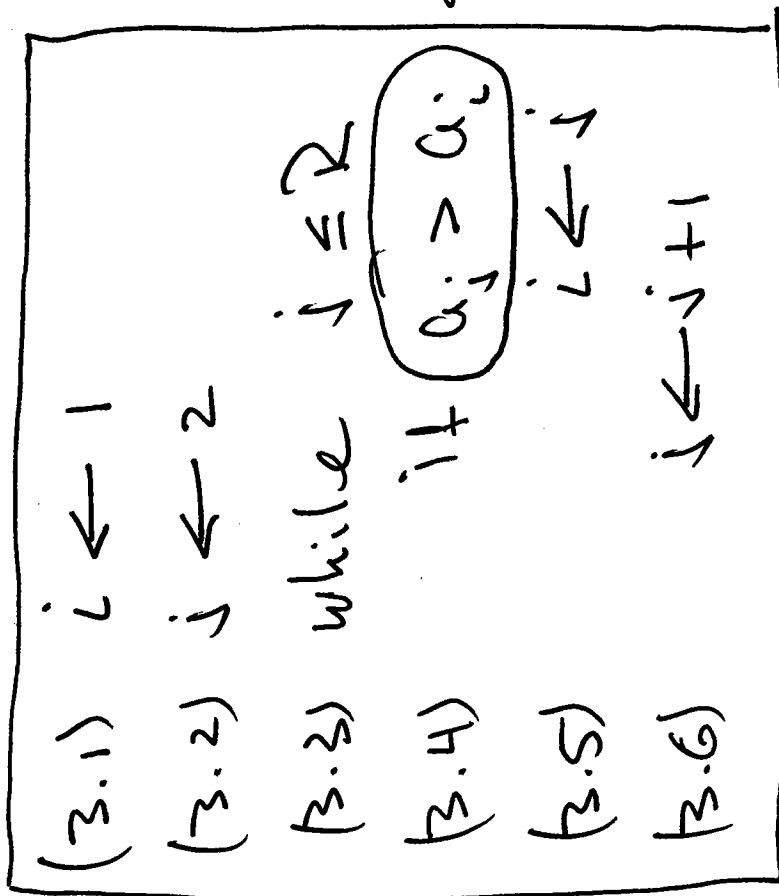
3.) $a \leftarrow a + b$

4.) $b \leftarrow a - b$

5.) $a \leftarrow a - b$

$\frac{a}{6} \quad 7$
 $\frac{b}{7} \quad 6$

REFINEMENT OF STEPS



BASIC OP:
COMPARISON OF
LIST ELEMENTS



Run Time Analysis

BASIC OPERATION: COMPARISON OF TWO LIST
ELEMENTS (AS TO THEIR
SIZE.)

WE COUNT # COMPARISON ON LIST OF
LENGTH n , IN BEST, WORST, & AVERAGE
CASES. I.E. COUNT # OF TIMES LINE
3.4 IS EXECUTED.

□

Note: Outer loop controlled by R
Inner " " " " j

comp

$$R = n \Rightarrow 2 \leq j \leq n \quad n-1$$

$$R = n-1 \Rightarrow 2 \leq j \leq n-1 \quad n-2$$

$$R = n-2 \Rightarrow 2 \leq j \leq n-2 \quad n-3$$

\vdots

$$R = 3 \Rightarrow 2 \leq j \leq 3 \quad 2$$

$$R = 2 \Rightarrow 2 \leq j \leq 2 \quad 1$$

$$\text{Total \# comp} = 1 + 2 + 3 + \dots + (n-3) + (n-2) + (n-1)$$

$$\underline{\text{Result}}: 1 + 2 + 3 + \dots + \textcircled{1} = \frac{\textcircled{1}(\textcircled{1}+1)}{2}$$

Result $\textcircled{1}$ by $(n-1)$

$$\therefore 1 + 2 + \dots + (n-1) = \frac{(n-1)(n-1+1)}{2} = \frac{n(n-1)}{2}$$

$$\text{Total \# comp} = \frac{n(n-1)}{2} = \frac{1}{2}n^2 - \frac{1}{2}n$$

Bubble Sort

Ex.
n=6

6 8 5 0 4 3 |

6 5 8 0 4 3 |

6 5 0 8 4 3 |

6 5 0 4 8 3 |

6 5 0 4 3 8 |

5 6 0 4 3 8 |

5 0 6 4 3 8 |

5 0 4 6 3 8 |

R

6

5

Q 4

5 0 4 3 | 6 8

0 5 4 3 | 6 8

0 4 5 3 | 6 8

0 4 3 5 | 6 8

0 3 4 5 | 6 8

0 | 3 4 5 6 8

3

2

1

Input: $n \geq 1, a_1, \dots, a_n$

Output: Modified list in inc. order

Bubble Sort

- 1.) $R \leftarrow N$
- 2.) while $R \geq 2$
- 3.) $j \leftarrow 2$
- 4.) while $j \leq R$
- 5.) if $a_j < a_{j-1}$
- 6.) swap $a_j \leftrightarrow a_{j-1}$
- 7.) $j \leftarrow j+1$
- 8.) $R \leftarrow R-1$
- 9.) stop

BASIC of
list Comparison



Run Time Analysis:

BASIC OF: COMPARISON OF LIST ELEMENTS
i.e. line

Comp

$$R = n \Rightarrow 2 \leq j \leq n$$

$$n-1$$

$$R = n-1 \Rightarrow 2 \leq j \leq n-1$$

$$n-2$$

⋮

⋮

$$R = 3 \Rightarrow 2 \leq j \leq 3$$

$$2$$

$$R = 2 \Rightarrow 2 \leq j \leq 2$$

$$1$$

$$\# \text{ Comp} = 1 + 2 + \dots + (n-1) = \frac{n(n-1)}{2} = \frac{1}{2}n^2 - \frac{1}{2}n$$