

CS140

- Who Am I?
- Who Are You?
- Course Overview
- Some Basics

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The Problem

Computational Problem: Specified by input/output pair

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Sorting

- Sorting Integers in Ascending Order (SIAO):
Input: A list of integers
Output: The input integers sorted in ascending order
- Example:
Input: 5,3,8,1,2
Output:

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The Algorithm

- Computational Problem: Specified by input/output pair
- Algorithm: Well-defined sequence of computational steps that produce a correct output for every valid input.

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What should an algorithm for SIAO do?

- Example 1:
 - Input: 5,3,8,1,2
 - Output: 1,2,3,5,8
- Example 2:
 - Input: 3,a,5.27,mudder
 - Output: we don't care

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An Algorithm for SIAO?

Sort1(S)

While there are integers x and y in S such that x precedes y in S and $x > y$

Swap x and y in S

Return S

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Sort1 Example

Input: 5, 3, 8, 1, 2

Swap 3 and 2: 5, 2, 8, 1, 3

Swap 3 and 5: 3, 2, 8, 1, 5

Swap 3 and 2:

Swap 2 and 1:

Swap 3 and 2:

Swap 8 and 5:

Swap 5 and 3:

Stop

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Sort1 Example cont.

Input: 5, 3, 8, 1, 2

Swap 3 and 2: 5, 2, 8, 1, 3

Swap 3 and 5: 3, 2, 8, 1, 5

Swap 3 and 2: 2, 3, 8, 1, 5

Swap 2 and 1: 1, 3, 8, 2, 5

Swap 3 and 2: 1, 2, 8, 3, 5

Swap 8 and 5: 1, 2, 5, 3, 8

Swap 5 and 3: 1, 2, 3, 5, 8

Stop

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Is Sort1 an algorithm?

Is Sort1(S) well-defined?

No - need to specify a selection rule.

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Huh? → Ta-da!

In the development cycle, the algorithm resides somewhere between A-ha and Ta-da!

Problem Specification → Running Program

Huh?



A-ha



Ta-da!



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