Data Structures and Algorithms

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Lecture 7 Built-in Linear Data Structures

Course Roadmap



Part 1: Linear Data Structures

Lecture 1: Complexity Analysis and Recursion

Lecture 2: Arrays

Lecture 3: Linked List

Lecture 4: Stack

Lecture 5: Queue

Lecture 6: Deque

Lecture 7: Built-in Linear Data Structures

We will discuss in this lecture the following topics

- 1- STL in C++ (Linear Data Structures)
- 2- Vector
- 3- List
- 4- Stack
- 5- Queue
- 6- Deque





Section 1: STL in C++ (Linear Data Structures)

Section 2: Vector

Section 3: List

Section 4: Stack

Section 5: Queue

Section 6: Deque







✓ Section 1: STL in C++ (Linear Data Structures)

Section 2: Vector

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Practice



HackerRank - Arrays & Linked Lists





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- [07] https://www.hackerrank.com/challenges/insert-a-node-at-the-head-of-a-linked-list/problem
- [08] https://www.hackerrank.com/challenges/insert-a-node-at-a-specific-position-in-a-linked-list/problem
- [09] https://www.hackerrank.com/challenges/delete-a-node-from-a-linked-list/problem
- [10] https://www.hackerrank.com/challenges/print-the-elements-of-a-linked-list-in-reverse/problem
- [11] https://www.hackerrank.com/challenges/reverse-a-linked-list/problem
- [12] https://www.hackerrank.com/challenges/compare-two-linked-lists/problem
- [13] https://www.hackerrank.com/challenges/merge-two-sorted-linked-lists/problem
- [14] https://www.hackerrank.com/challenges/get-the-value-of-the-node-at-a-specific-position-from-the-tail/problem
- [15] https://www.hackerrank.com/challenges/delete-duplicate-value-nodes-from-a-sorted-linked-list/problem
- [16] https://www.hackerrank.com/challenges/find-the-merge-point-of-two-joined-linked-lists/problem
- [17] https://www.hackerrank.com/challenges/insert-a-node-into-a-sorted-doubly-linked-list/problem





- [01] https://www.hackerearth.com/practice/data-structures/arrays/1-d/practice-problems/algorithm/range-query-2/
- [02] https://www.hackerearth.com/practice/data-structures/arrays/1-d/practice-problems/algorithm/bracket-sequence-1-40eab940/
- [03] https://www.hackerearth.com/practice/data-structures/arrays/1-d/practice-problems/algorithm/monk-and-welcome-problem/
- [04] https://www.hackerearth.com/practice/data-structures/arrays/1-d/practice-problems/algorithm/micro-and-array-update/
- [05] https://www.hackerearth.com/practice/data-structures/hash-tables/basics-of-hash-tables/practice-problems/algorithm/prime-string-5e4e5f32/
- [06] https://www.hackerearth.com/practice/data-structures/arrays/1-d/practice-problems/algorithm/pairs-having-similar-element-eed098aa/
- [07] https://www.hackerearth.com/practice/data-structures/arrays/1-d/practice-problems/algorithm/hamiltonian-and-lagrangian/
- [08] https://www.hackerearth.com/practice/data-structures/arrays/1-d/practice-problems/algorithm/charged-up-array-f35a5e23/
- [09] https://www.hackerearth.com/practice/data-structures/arrays/1-d/practice-problems/algorithm/polygon-possible/
- [10] https://www.hackerearth.com/practice/data-structures/arrays/1-d/practice-problems/algorithm/charges-repel/
- [11] https://www.hackerearth.com/practice/data-structures/arrays/1-d/practice-problems/algorithm/monk-and-power-of-time/
- [12] https://www.hackerearth.com/practice/data-structures/arrays/1-d/practice-problems/algorithm/long-atm-queue-3/
- [13] https://www.hackerearth.com/practice/data-structures/arrays/1-d/practice-problems/algorithm/help-jarvis-8a39566e/
- [14] https://www.hackerearth.com/practice/data-structures/arrays/1-d/practice-problems/algorithm/no-sharing-capillary-82ed3fe2/
- [15] https://www.hackerearth.com/practice/data-structures/arrays/1-d/practice-problems/algorithm/maximize-the-earning-137963bc-323025a6/
- [16] https://www.hackerearth.com/practice/data-structures/arrays/1-d/practice-problems/algorithm/strange-game-1-7e758acb-1bff10f0/
- [17] https://www.hackerearth.com/practice/data-structures/arrays/1-d/practice-problems/algorithm/pepper-and-contiguous-even-subarray-9f3adf65/
- [18] https://www.hackerearth.com/practice/data-structures/arrays/1-d/practice-problems/algorithm/not-in-range-44d19403/





- [19] https://www.hackerearth.com/practice/data-structures/arrays/1-d/practice-problems/algorithm/eedc/
- [20] https://www.hackerearth.com/practice/data-structures/arrays/1-d/practice-problems/algorithm/infinity-array-715a233b/
- [21] https://www.hackerearth.com/practice/data-structures/arrays/1-d/practice-problems/algorithm/maximum-of-k-size-subarrays-deque/
- [22] https://www.hackerearth.com/practice/data-structures/arrays/1-d/practice-problems/algorithm/modify-sequence/
- [23] https://www.hackerearth.com/practice/data-structures/arrays/1-d/practice-problems/algorithm/counting-the-subarrays-4187713a/
- [24] https://www.hackerearth.com/practice/data-structures/arrays/1-d/practice-problems/algorithm/digitial-sequence-ee0ea080/
- [25] https://www.hackerearth.com/practice/data-structures/arrays/1-d/practice-problems/algorithm/monk-and-lucky-minimum-3/
- [26] https://www.hackerearth.com/practice/data-structures/arrays/1-d/practice-problems/algorithm/monk-and-rotation-3/
- [27] https://www.hackerearth.com/practice/data-structures/arrays/1-d/practice-problems/algorithm/snackdown-contest/
- [28] https://www.hackerearth.com/practice/data-structures/arrays/1-d/practice-problems/algorithm/mark-the-answer-1/
- [29] https://www.hackerearth.com/practice/data-structures/arrays/1-d/practice-problems/algorithm/pairs-16/
- [30] https://www.hackerearth.com/practice/data-structures/arrays/1-d/practice-problems/algorithm/maximum-goodness/
- [31] https://www.hackerearth.com/practice/data-structures/arrays/1-d/practice-problems/golf/distinct-count-2/
- [32] https://www.hackerearth.com/practice/data-structures/arrays/1-d/practice-problems/algorithm/perfect-subarray-43560f46/
- [33] https://www.hackerearth.com/practice/data-structures/arrays/1-d/practice-problems/algorithm/2-arrays-90c9019c/
- [34] https://www.hackerearth.com/practice/data-structures/arrays/1-d/practice-problems/algorithm/achhe-din-6baeb5d1/
- [35] https://www.hackerearth.com/practice/data-structures/arrays/1-d/practice-problems/algorithm/sumit-and-equal-array/
- [36] https://www.hackerearth.com/practice/data-structures/arrays/1-d/practice-problems/algorithm/lal-evaluation/





- [37] https://www.hackerearth.com/practice/data-structures/arrays/1-d/practice-problems/algorithm/baaki-che/
- [38] https://www.hackerearth.com/practice/data-structures/arrays/1-d/practice-problems/algorithm/1st/
- [39] https://www.hackerearth.com/practice/data-structures/arrays/1-d/practice-problems/algorithm/sumits-love-for-maths/
- [40] https://www.hackerearth.com/practice/data-structures/arrays/1-d/practice-problems/algorithm/speed-7/
- [41] https://www.hackerearth.com/practice/data-structures/arrays/1-d/practice-problems/algorithm/b-39/
- [42] https://www.hackerearth.com/practice/data-structures/arrays/1-d/practice-problems/algorithm/testing-strings-d1f28949/
- [43] https://www.hackerearth.com/practice/data-structures/arrays/1-d/practice-problems/algorithm/equal-sum-5b547fc2/
- [44] https://www.hackerearth.com/practice/data-structures/arrays/1-d/practice-problems/algorithm/anshul-usama-and-punishment-a-64758169-ed00e7ab/
- [45] https://www.hackerearth.com/practice/data-structures/arrays/1-d/practice-problems/algorithm/is-it-some-space-cakewalk/
- [46] https://www.hackerearth.com/practice/data-structures/arrays/1-d/practice-problems/algorithm/x-4/
- [47] https://www.hackerearth.com/practice/data-structures/arrays/1-d/practice-problems/algorithm/zulu-encounters-a-sequence-problem/
- [48] https://www.hackerearth.com/practice/data-structures/arrays/1-d/practice-problems/algorithm/k-rotation-is-what-you-can-855157f8/
- [49] https://www.hackerearth.com/practice/data-structures/arrays/1-d/practice-problems/algorithm/can-you-solve-it/
- [50] https://www.hackerearth.com/practice/data-structures/arrays/1-d/practice-problems/algorithm/beautiful-segments/
- [51] https://www.hackerearth.com/practice/data-structures/arrays/1-d/practice-problems/algorithm/tired-of-trying/
- [52] https://www.hackerearth.com/practice/data-structures/arrays/1-d/practice-problems/algorithm/prasun-the-detective-77f90f8f/
- [53] https://www.hackerearth.com/practice/data-structures/arrays/1-d/practice-problems/algorithm/in-an-array-9fbe4c12/
- [54] https://www.hackerearth.com/practice/data-structures/arrays/1-d/practice-problems/algorithm/unique-subarrays/





- [55] https://www.hackerearth.com/practice/data-structures/arrays/1-d/practice-problems/algorithm/supreme-subset-bb866a75/
- [56] https://www.hackerearth.com/practice/data-structures/arrays/1-d/practice-problems/algorithm/thief-and-warehouses-6ebf4e07/
- [57] https://www.hackerearth.com/practice/data-structures/arrays/1-d/practice-problems/algorithm/save-mrinal-35296e39/
- [58] https://www.hackerearth.com/practice/data-structures/arrays/1-d/practice-problems/algorithm/battlefield-13/
- [59] https://www.hackerearth.com/practice/data-structures/arrays/1-d/practice-problems/algorithm/fredo-and-large-numbers/
- [60] https://www.hackerearth.com/practice/data-structures/arrays/1-d/practice-problems/algorithm/segment-tree-baby/
- [61] https://www.hackerearth.com/practice/data-structures/arrays/1-d/practice-problems/algorithm/the-amazing-race-1/
- [62] https://www.hackerearth.com/practice/data-structures/arrays/1-d/practice-problems/algorithm/minimum-and-xor-or-6a05bbd4/
- [63] https://www.hackerearth.com/practice/data-structures/arrays/1-d/practice-problems/algorithm/beautiful-journey-1/
- [64] https://www.hackerearth.com/practice/data-structures/arrays/1-d/practice-problems/algorithm/long-jump-1-7d02705a/
- [65] https://www.hackerearth.com/practice/data-structures/arrays/1-d/practice-problems/algorithm/fixed-parity-440254c0/
- [66] https://www.hackerearth.com/practice/data-structures/arrays/1-d/practice-problems/algorithm/the-code-generator-9d3f9afa/

HackerEarth - Arrays Multi-dimensional





- [01] https://www.hackerearth.com/practice/data-structures/arrays/multi-dimensional/practice-problems/algorithm/roy-and-symmetric-logos-1/
- [02] https://www.hackerearth.com/practice/data-structures/arrays/multi-dimensional/practice-problems/algorithm/monk-and-operations/
- [03] https://www.hackerearth.com/practice/data-structures/arrays/multi-dimensional/practice-problems/algorithm/jadvaliioo-62280ff6/
- [04] https://www.hackerearth.com/practice/data-structures/arrays/multi-dimensional/practice-problems/algorithm/left-or-right-92c0b54c/
- [05] https://www.hackerearth.com/practice/data-structures/arrays/multi-dimensional/practice-problems/algorithm/honey-bees/
- [06] https://www.hackerearth.com/practice/data-structures/arrays/multi-dimensional/practice-problems/algorithm/monk-and-inversions-arrays-strings/
- [07] https://www.hackerearth.com/practice/data-structures/arrays/multi-dimensional/practice-problems/algorithm/find-the-string-4014dec6/
- [08] https://www.hackerearth.com/practice/data-structures/arrays/multi-dimensional/practice-problems/algorithm/the-wealthy-landlord/
- [09] https://www.hackerearth.com/practice/data-structures/arrays/multi-dimensional/practice-problems/algorithm/add-alternate-elements-of-2-dimensional-array/
- [10] https://www.hackerearth.com/practice/data-structures/arrays/multi-dimensional/practice-problems/algorithm/binary-blocks-4b173d4a/
- [11] https://www.hackerearth.com/practice/data-structures/arrays/multi-dimensional/practice-problems/algorithm/micro-and-sweet-distribution/
- [12] https://www.hackerearth.com/practice/data-structures/arrays/multi-dimensional/practice-problems/algorithm/saul-goodmans-problem-statement/
- [13] https://www.hackerearth.com/practice/data-structures/arrays/multi-dimensional/practice-problems/algorithm/k-priority-interview-d3447f63/
- [14] https://www.hackerearth.com/practice/data-structures/arrays/multi-dimensional/practice-problems/algorithm/square-sub-matrix-880321bd/
- [15] https://www.hackerearth.com/practice/data-structures/arrays/multi-dimensional/practice-problems/algorithm/magic-square-1-0747cf2f/
- [16] https://www.hackerearth.com/practice/data-structures/arrays/multi-dimensional/practice-problems/algorithm/submatrix-updates-1/
- [17] https://www.hackerearth.com/practice/data-structures/arrays/multi-dimensional/practice-problems/algorithm/welcome-to-pu-661e1420/
- [18] https://www.hackerearth.com/practice/data-structures/arrays/multi-dimensional/practice-problems/algorithm/largest-square-3d7a938a/



- ✓ Section 1: STL in C++ (Linear Data Structures)
- ✓ Section 2: Vector

Section 3: List

Section 4: Stack

Section 5: Queue

Section 6: Deque



Practice



HackerRank - Arrays & Linked Lists







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- [08] https://www.hackerearth.com/practice/data-structures/arrays/1-d/practice-problems/algorithm/charged-up-array-f35a5e23/
- [09] https://www.hackerearth.com/practice/data-structures/arrays/1-d/practice-problems/algorithm/polygon-possible/
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- [11] https://www.hackerearth.com/practice/data-structures/arrays/1-d/practice-problems/algorithm/monk-and-power-of-time/
- [12] https://www.hackerearth.com/practice/data-structures/arrays/1-d/practice-problems/algorithm/long-atm-queue-3/
- [13] https://www.hackerearth.com/practice/data-structures/arrays/1-d/practice-problems/algorithm/help-jarvis-8a39566e/
- [14] https://www.hackerearth.com/practice/data-structures/arrays/1-d/practice-problems/algorithm/no-sharing-capillary-82ed3fe2/
- [15] https://www.hackerearth.com/practice/data-structures/arrays/1-d/practice-problems/algorithm/maximize-the-earning-137963bc-323025a6/
- [16] https://www.hackerearth.com/practice/data-structures/arrays/1-d/practice-problems/algorithm/strange-game-1-7e758acb-1bff10f0/
- [17] https://www.hackerearth.com/practice/data-structures/arrays/1-d/practice-problems/algorithm/pepper-and-contiguous-even-subarray-9f3adf65/
- [18] https://www.hackerearth.com/practice/data-structures/arrays/1-d/practice-problems/algorithm/not-in-range-44d19403/





- [19] https://www.hackerearth.com/practice/data-structures/arrays/1-d/practice-problems/algorithm/eedc/
- [20] https://www.hackerearth.com/practice/data-structures/arrays/1-d/practice-problems/algorithm/infinity-array-715a233b/
- [21] https://www.hackerearth.com/practice/data-structures/arrays/1-d/practice-problems/algorithm/maximum-of-k-size-subarrays-deque/
- [22] https://www.hackerearth.com/practice/data-structures/arrays/1-d/practice-problems/algorithm/modify-sequence/
- [23] https://www.hackerearth.com/practice/data-structures/arrays/1-d/practice-problems/algorithm/counting-the-subarrays-4187713a/
- [24] https://www.hackerearth.com/practice/data-structures/arrays/1-d/practice-problems/algorithm/digitial-sequence-ee0ea080/
- [25] https://www.hackerearth.com/practice/data-structures/arrays/1-d/practice-problems/algorithm/monk-and-lucky-minimum-3/
- [26] https://www.hackerearth.com/practice/data-structures/arrays/1-d/practice-problems/algorithm/monk-and-rotation-3/
- [27] https://www.hackerearth.com/practice/data-structures/arrays/1-d/practice-problems/algorithm/snackdown-contest/
- [28] https://www.hackerearth.com/practice/data-structures/arrays/1-d/practice-problems/algorithm/mark-the-answer-1/
- [29] https://www.hackerearth.com/practice/data-structures/arrays/1-d/practice-problems/algorithm/pairs-16/
- [30] https://www.hackerearth.com/practice/data-structures/arrays/1-d/practice-problems/algorithm/maximum-goodness/
- [31] https://www.hackerearth.com/practice/data-structures/arrays/1-d/practice-problems/golf/distinct-count-2/
- [32] https://www.hackerearth.com/practice/data-structures/arrays/1-d/practice-problems/algorithm/perfect-subarray-43560f46/
- [33] https://www.hackerearth.com/practice/data-structures/arrays/1-d/practice-problems/algorithm/2-arrays-90c9019c/
- [34] https://www.hackerearth.com/practice/data-structures/arrays/1-d/practice-problems/algorithm/achhe-din-6baeb5d1/
- [35] https://www.hackerearth.com/practice/data-structures/arrays/1-d/practice-problems/algorithm/sumit-and-equal-array/
- [36] https://www.hackerearth.com/practice/data-structures/arrays/1-d/practice-problems/algorithm/lal-evaluation/





- [37] https://www.hackerearth.com/practice/data-structures/arrays/1-d/practice-problems/algorithm/baaki-che/
- [38] https://www.hackerearth.com/practice/data-structures/arrays/1-d/practice-problems/algorithm/1st/
- [39] https://www.hackerearth.com/practice/data-structures/arrays/1-d/practice-problems/algorithm/sumits-love-for-maths/
- [40] https://www.hackerearth.com/practice/data-structures/arrays/1-d/practice-problems/algorithm/speed-7/
- [41] https://www.hackerearth.com/practice/data-structures/arrays/1-d/practice-problems/algorithm/b-39/
- [42] https://www.hackerearth.com/practice/data-structures/arrays/1-d/practice-problems/algorithm/testing-strings-d1f28949/
- [43] https://www.hackerearth.com/practice/data-structures/arrays/1-d/practice-problems/algorithm/equal-sum-5b547fc2/
- [44] https://www.hackerearth.com/practice/data-structures/arrays/1-d/practice-problems/algorithm/anshul-usama-and-punishment-a-64758169-ed00e7ab/
- [45] https://www.hackerearth.com/practice/data-structures/arrays/1-d/practice-problems/algorithm/is-it-some-space-cakewalk/
- [46] https://www.hackerearth.com/practice/data-structures/arrays/1-d/practice-problems/algorithm/x-4/
- [47] https://www.hackerearth.com/practice/data-structures/arrays/1-d/practice-problems/algorithm/zulu-encounters-a-sequence-problem/
- [48] https://www.hackerearth.com/practice/data-structures/arrays/1-d/practice-problems/algorithm/k-rotation-is-what-you-can-855157f8/
- [49] https://www.hackerearth.com/practice/data-structures/arrays/1-d/practice-problems/algorithm/can-you-solve-it/
- [50] https://www.hackerearth.com/practice/data-structures/arrays/1-d/practice-problems/algorithm/beautiful-segments/
- [51] https://www.hackerearth.com/practice/data-structures/arrays/1-d/practice-problems/algorithm/tired-of-trying/
- [52] https://www.hackerearth.com/practice/data-structures/arrays/1-d/practice-problems/algorithm/prasun-the-detective-77f90f8f/
- [53] https://www.hackerearth.com/practice/data-structures/arrays/1-d/practice-problems/algorithm/in-an-array-9fbe4c12/
- [54] https://www.hackerearth.com/practice/data-structures/arrays/1-d/practice-problems/algorithm/unique-subarrays/





- [55] https://www.hackerearth.com/practice/data-structures/arrays/1-d/practice-problems/algorithm/supreme-subset-bb866a75/
- [56] https://www.hackerearth.com/practice/data-structures/arrays/1-d/practice-problems/algorithm/thief-and-warehouses-6ebf4e07/
- [57] https://www.hackerearth.com/practice/data-structures/arrays/1-d/practice-problems/algorithm/save-mrinal-35296e39/
- [58] https://www.hackerearth.com/practice/data-structures/arrays/1-d/practice-problems/algorithm/battlefield-13/
- [59] https://www.hackerearth.com/practice/data-structures/arrays/1-d/practice-problems/algorithm/fredo-and-large-numbers/
- [60] https://www.hackerearth.com/practice/data-structures/arrays/1-d/practice-problems/algorithm/segment-tree-baby/
- [61] https://www.hackerearth.com/practice/data-structures/arrays/1-d/practice-problems/algorithm/the-amazing-race-1/
- [62] https://www.hackerearth.com/practice/data-structures/arrays/1-d/practice-problems/algorithm/minimum-and-xor-or-6a05bbd4/
- [63] https://www.hackerearth.com/practice/data-structures/arrays/1-d/practice-problems/algorithm/beautiful-journey-1/
- [64] https://www.hackerearth.com/practice/data-structures/arrays/1-d/practice-problems/algorithm/long-jump-1-7d02705a/
- [65] https://www.hackerearth.com/practice/data-structures/arrays/1-d/practice-problems/algorithm/fixed-parity-440254c0/
- [66] https://www.hackerearth.com/practice/data-structures/arrays/1-d/practice-problems/algorithm/the-code-generator-9d3f9afa/

HackerEarth - Arrays Multi-dimensional





- [01] https://www.hackerearth.com/practice/data-structures/arrays/multi-dimensional/practice-problems/algorithm/roy-and-symmetric-logos-1/
- [02] https://www.hackerearth.com/practice/data-structures/arrays/multi-dimensional/practice-problems/algorithm/monk-and-operations/
- [03] https://www.hackerearth.com/practice/data-structures/arrays/multi-dimensional/practice-problems/algorithm/jadvaliioo-62280ff6/
- [04] https://www.hackerearth.com/practice/data-structures/arrays/multi-dimensional/practice-problems/algorithm/left-or-right-92c0b54c/
- [05] https://www.hackerearth.com/practice/data-structures/arrays/multi-dimensional/practice-problems/algorithm/honey-bees/
- [06] https://www.hackerearth.com/practice/data-structures/arrays/multi-dimensional/practice-problems/algorithm/monk-and-inversions-arrays-strings/
- [07] https://www.hackerearth.com/practice/data-structures/arrays/multi-dimensional/practice-problems/algorithm/find-the-string-4014dec6/
- [08] https://www.hackerearth.com/practice/data-structures/arrays/multi-dimensional/practice-problems/algorithm/the-wealthy-landlord/
- [09] https://www.hackerearth.com/practice/data-structures/arrays/multi-dimensional/practice-problems/algorithm/add-alternate-elements-of-2-dimensional-array/
- [10] https://www.hackerearth.com/practice/data-structures/arrays/multi-dimensional/practice-problems/algorithm/binary-blocks-4b173d4a/
- [11] https://www.hackerearth.com/practice/data-structures/arrays/multi-dimensional/practice-problems/algorithm/micro-and-sweet-distribution/
- [12] https://www.hackerearth.com/practice/data-structures/arrays/multi-dimensional/practice-problems/algorithm/saul-goodmans-problem-statement/
- [13] https://www.hackerearth.com/practice/data-structures/arrays/multi-dimensional/practice-problems/algorithm/k-priority-interview-d3447f63/
- [14] https://www.hackerearth.com/practice/data-structures/arrays/multi-dimensional/practice-problems/algorithm/square-sub-matrix-880321bd/
- [15] https://www.hackerearth.com/practice/data-structures/arrays/multi-dimensional/practice-problems/algorithm/magic-square-1-0747cf2f/
- [16] https://www.hackerearth.com/practice/data-structures/arrays/multi-dimensional/practice-problems/algorithm/submatrix-updates-1/
- [17] https://www.hackerearth.com/practice/data-structures/arrays/multi-dimensional/practice-problems/algorithm/welcome-to-pu-661e1420/
- [18] https://www.hackerearth.com/practice/data-structures/arrays/multi-dimensional/practice-problems/algorithm/largest-square-3d7a938a/



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- [01] https://www.hackerrank.com/challenges/equal-stacks/problem
- [02] https://www.hackerrank.com/challenges/queue-using-two-stacks
- [03] https://www.hackerrank.com/challenges/balanced-brackets
- [04] https://www.hackerrank.com/challenges/castle-on-the-grid
- [05] https://www.hackerrank.com/challenges/down-to-zero-ii
- [06] https://www.hackerrank.com/challenges/largest-rectangle
- [07] https://www.hackerrank.com/challenges/simple-text-editor
- [08] https://www.hackerrank.com/challenges/waiter
- [09] https://www.hackerrank.com/challenges/truck-tour
- [10] https://www.hackerrank.com/challenges/queries-with-fixed-length
- [11] https://www.hackerrank.com/challenges/poisonous-plants/problem
- [12] https://www.hackerrank.com/challenges/and-xor-or

HackerEarth - Stacks





- [01] https://www.hackerearth.com/practice/data-structures/stacks/basics-of-stacks/practice-problems/algorithm/a-game-of-numbers-1-5d3a8cb3/
- [02] https://www.hackerearth.com/practice/data-structures/stacks/basics-of-stacks/practice-problems/algorithm/balanced-brackets-3-4fc590c6/
- [03] https://www.hackerearth.com/practice/data-structures/stacks/basics-of-stacks/practice-problems/algorithm/fun-game-91510e9f/
- [04] https://www.hackerearth.com/practice/data-structures/stacks/basics-of-stacks/practice-problems/algorithm/little-shino-and-pairs/
- [05] https://www.hackerearth.com/practice/data-structures/stacks/basics-of-stacks/practice-problems/algorithm/staque-1-e790a29f/
- [06] https://www.hackerearth.com/practice/data-structures/stacks/basics-of-stacks/practice-problems/algorithm/monk-and-prisoner-of-azkaban/
- [07] https://www.hackerearth.com/practice/data-structures/stacks/basics-of-stacks/practice-problems/algorithm/circular-list-8e1319c9/
- [08] https://www.hackerearth.com/practice/data-structures/stacks/basics-of-stacks/practice-problems/algorithm/minimum-add-to-make-parentheses-valid-9cba6259/
- [09] https://www.hackerearth.com/practice/data-structures/stacks/basics-of-stacks/practice-problems/algorithm/bag-of-numbers/
- [10] https://www.hackerearth.com/practice/data-structures/stacks/basics-of-stacks/practice-problems/algorithm/stakth-1-e6a76632/
- [11] https://www.hackerearth.com/practice/data-structures/stacks/basics-of-stacks/practice-problems/algorithm/book-exercises-843d7c3b/
- [12] https://www.hackerearth.com/practice/data-structures/stacks/basics-of-stacks/practice-problems/algorithm/super-reduced-strings-303701dd/
- [13] https://www.hackerearth.com/practice/data-structures/stacks/basics-of-stacks/practice-problems/algorithm/jumpy-humpy-5e0231d6/
- [14] https://www.hackerearth.com/practice/data-structures/stacks/basics-of-stacks/practice-problems/algorithm/little-monk-and-balanced-parentheses/
- [15] https://www.hackerearth.com/practice/data-structures/stacks/basics-of-stacks/practice-problems/algorithm/mancunian-and-fantabulous-pairs/
- [16] https://www.hackerearth.com/practice/data-structures/stacks/basics-of-stacks/practice-problems/algorithm/coding-legacy-in-nirma-2/
- [17] https://www.hackerearth.com/practice/data-structures/stacks/basics-of-stacks/practice-problems/algorithm/nitish-and-pillars-0b5cfac4/
- [18] https://www.hackerearth.com/practice/data-structures/stacks/basics-of-stacks/practice-problems/algorithm/nearest-smaller-element-929558b4/

HackerEarth - Stacks





- [19] https://www.hackerearth.com/practice/data-structures/stacks/basics-of-stacks/practice-problems/algorithm/monk-celebrating-checkpoint/
- [20] https://www.hackerearth.com/practice/data-structures/stacks/basics-of-stacks/practice-problems/algorithm/capital-of-hills/
- [21] https://www.hackerearth.com/practice/data-structures/stacks/basics-of-stacks/practice-problems/algorithm/feel-taller/
- [22] https://www.hackerearth.com/practice/data-structures/stacks/basics-of-stacks/practice-problems/algorithm/signal-range/
- [23] https://www.hackerearth.com/practice/data-structures/stacks/basics-of-stacks/practice-problems/algorithm/monk-and-order-of-phoenix/
- [24] https://www.hackerearth.com/practice/data-structures/stacks/basics-of-stacks/practice-problems/algorithm/grandmaster/
- [25] https://www.hackerearth.com/practice/data-structures/stacks/basics-of-stacks/practice-problems/algorithm/fight-for-laddus/

HackerEarth - Queues





- [01] https://www.hackerearth.com/practice/data-structures/queues/basics-of-queues/practice-problems/algorithm/monk-and-power-of-time-3a648bf0/
- [02] https://www.hackerearth.com/practice/data-structures/queues/basics-of-queues/practice-problems/algorithm/monk-and-chamber-of-secrets/
- [03] https://www.hackerearth.com/practice/data-structures/queues/basics-of-queues/practice-problems/algorithm/disk-tower-b7cc7a50/
- [04] https://www.hackerearth.com/practice/data-structures/queues/basics-of-queues/practice-problems/algorithm/number-recovery-0b988eb2/
- [05] https://www.hackerearth.com/practice/data-structures/queues/basics-of-queues/practice-problems/algorithm/little-monk-and-goblet-of-fire/
- [06] https://www.hackerearth.com/practice/data-structures/queues/basics-of-queues/practice-problems/algorithm/weird-planet-2000a170/



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- [03] https://www.hackerrank.com/challenges/balanced-brackets
- [04] https://www.hackerrank.com/challenges/castle-on-the-grid
- [05] https://www.hackerrank.com/challenges/down-to-zero-ii
- [06] https://www.hackerrank.com/challenges/largest-rectangle
- [07] https://www.hackerrank.com/challenges/simple-text-editor
- [08] https://www.hackerrank.com/challenges/waiter
- [09] https://www.hackerrank.com/challenges/truck-tour
- [10] https://www.hackerrank.com/challenges/queries-with-fixed-length
- [11] https://www.hackerrank.com/challenges/poisonous-plants/problem
- [12] https://www.hackerrank.com/challenges/and-xor-or

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- [01] https://www.hackerearth.com/practice/data-structures/stacks/basics-of-stacks/practice-problems/algorithm/a-game-of-numbers-1-5d3a8cb3/
- [02] https://www.hackerearth.com/practice/data-structures/stacks/basics-of-stacks/practice-problems/algorithm/balanced-brackets-3-4fc590c6/
- [03] https://www.hackerearth.com/practice/data-structures/stacks/basics-of-stacks/practice-problems/algorithm/fun-game-91510e9f/
- [04] https://www.hackerearth.com/practice/data-structures/stacks/basics-of-stacks/practice-problems/algorithm/little-shino-and-pairs/
- [05] https://www.hackerearth.com/practice/data-structures/stacks/basics-of-stacks/practice-problems/algorithm/staque-1-e790a29f/
- [06] https://www.hackerearth.com/practice/data-structures/stacks/basics-of-stacks/practice-problems/algorithm/monk-and-prisoner-of-azkaban/
- [07] https://www.hackerearth.com/practice/data-structures/stacks/basics-of-stacks/practice-problems/algorithm/circular-list-8e1319c9/
- [08] https://www.hackerearth.com/practice/data-structures/stacks/basics-of-stacks/practice-problems/algorithm/minimum-add-to-make-parentheses-valid-9cba6259/
- [09] https://www.hackerearth.com/practice/data-structures/stacks/basics-of-stacks/practice-problems/algorithm/bag-of-numbers/
- [10] https://www.hackerearth.com/practice/data-structures/stacks/basics-of-stacks/practice-problems/algorithm/stakth-1-e6a76632/
- [11] https://www.hackerearth.com/practice/data-structures/stacks/basics-of-stacks/practice-problems/algorithm/book-exercises-843d7c3b/
- [12] https://www.hackerearth.com/practice/data-structures/stacks/basics-of-stacks/practice-problems/algorithm/super-reduced-strings-303701dd/
- [13] https://www.hackerearth.com/practice/data-structures/stacks/basics-of-stacks/practice-problems/algorithm/jumpy-humpy-5e0231d6/
- [14] https://www.hackerearth.com/practice/data-structures/stacks/basics-of-stacks/practice-problems/algorithm/little-monk-and-balanced-parentheses/
- [15] https://www.hackerearth.com/practice/data-structures/stacks/basics-of-stacks/practice-problems/algorithm/mancunian-and-fantabulous-pairs/
- [16] https://www.hackerearth.com/practice/data-structures/stacks/basics-of-stacks/practice-problems/algorithm/coding-legacy-in-nirma-2/
- [17] https://www.hackerearth.com/practice/data-structures/stacks/basics-of-stacks/practice-problems/algorithm/nitish-and-pillars-0b5cfac4/
- [18] https://www.hackerearth.com/practice/data-structures/stacks/basics-of-stacks/practice-problems/algorithm/nearest-smaller-element-929558b4/

HackerEarth - Stacks





- [19] https://www.hackerearth.com/practice/data-structures/stacks/basics-of-stacks/practice-problems/algorithm/monk-celebrating-checkpoint/
- [20] https://www.hackerearth.com/practice/data-structures/stacks/basics-of-stacks/practice-problems/algorithm/capital-of-hills/
- [21] https://www.hackerearth.com/practice/data-structures/stacks/basics-of-stacks/practice-problems/algorithm/feel-taller/
- [22] https://www.hackerearth.com/practice/data-structures/stacks/basics-of-stacks/practice-problems/algorithm/signal-range/
- [23] https://www.hackerearth.com/practice/data-structures/stacks/basics-of-stacks/practice-problems/algorithm/monk-and-order-of-phoenix/
- [24] https://www.hackerearth.com/practice/data-structures/stacks/basics-of-stacks/practice-problems/algorithm/grandmaster/
- [25] https://www.hackerearth.com/practice/data-structures/stacks/basics-of-stacks/practice-problems/algorithm/fight-for-laddus/

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- [01] https://www.hackerearth.com/practice/data-structures/queues/basics-of-queues/practice-problems/algorithm/monk-and-power-of-time-3a648bf0/
- [02] https://www.hackerearth.com/practice/data-structures/queues/basics-of-queues/practice-problems/algorithm/monk-and-chamber-of-secrets/
- [03] https://www.hackerearth.com/practice/data-structures/queues/basics-of-queues/practice-problems/algorithm/disk-tower-b7cc7a50/
- [04] https://www.hackerearth.com/practice/data-structures/queues/basics-of-queues/practice-problems/algorithm/number-recovery-0b988eb2/
- [05] https://www.hackerearth.com/practice/data-structures/queues/basics-of-queues/practice-problems/algorithm/little-monk-and-goblet-of-fire/
- [06] https://www.hackerearth.com/practice/data-structures/queues/basics-of-queues/practice-problems/algorithm/weird-planet-2000a170/



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HackerRank - Stacks & Queues





- [01] https://www.hackerrank.com/challenges/equal-stacks/problem
- [02] https://www.hackerrank.com/challenges/queue-using-two-stacks
- [03] https://www.hackerrank.com/challenges/balanced-brackets
- [04] https://www.hackerrank.com/challenges/castle-on-the-grid
- [05] https://www.hackerrank.com/challenges/down-to-zero-ii
- [06] https://www.hackerrank.com/challenges/largest-rectangle
- [07] https://www.hackerrank.com/challenges/simple-text-editor
- [08] https://www.hackerrank.com/challenges/waiter
- [09] https://www.hackerrank.com/challenges/truck-tour
- [10] https://www.hackerrank.com/challenges/queries-with-fixed-length
- [11] https://www.hackerrank.com/challenges/poisonous-plants/problem
- [12] https://www.hackerrank.com/challenges/and-xor-or

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- [01] https://www.hackerearth.com/practice/data-structures/stacks/basics-of-stacks/practice-problems/algorithm/a-game-of-numbers-1-5d3a8cb3/
- [02] https://www.hackerearth.com/practice/data-structures/stacks/basics-of-stacks/practice-problems/algorithm/balanced-brackets-3-4fc590c6/
- [03] https://www.hackerearth.com/practice/data-structures/stacks/basics-of-stacks/practice-problems/algorithm/fun-game-91510e9f/
- [04] https://www.hackerearth.com/practice/data-structures/stacks/basics-of-stacks/practice-problems/algorithm/little-shino-and-pairs/
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- [06] https://www.hackerearth.com/practice/data-structures/stacks/basics-of-stacks/practice-problems/algorithm/monk-and-prisoner-of-azkaban/
- [07] https://www.hackerearth.com/practice/data-structures/stacks/basics-of-stacks/practice-problems/algorithm/circular-list-8e1319c9/
- [08] https://www.hackerearth.com/practice/data-structures/stacks/basics-of-stacks/practice-problems/algorithm/minimum-add-to-make-parentheses-valid-9cba6259/
- [09] https://www.hackerearth.com/practice/data-structures/stacks/basics-of-stacks/practice-problems/algorithm/bag-of-numbers/
- [10] https://www.hackerearth.com/practice/data-structures/stacks/basics-of-stacks/practice-problems/algorithm/stakth-1-e6a76632/
- [11] https://www.hackerearth.com/practice/data-structures/stacks/basics-of-stacks/practice-problems/algorithm/book-exercises-843d7c3b/
- [12] https://www.hackerearth.com/practice/data-structures/stacks/basics-of-stacks/practice-problems/algorithm/super-reduced-strings-303701dd/
- [13] https://www.hackerearth.com/practice/data-structures/stacks/basics-of-stacks/practice-problems/algorithm/jumpy-humpy-5e0231d6/
- [14] https://www.hackerearth.com/practice/data-structures/stacks/basics-of-stacks/practice-problems/algorithm/little-monk-and-balanced-parentheses/
- [15] https://www.hackerearth.com/practice/data-structures/stacks/basics-of-stacks/practice-problems/algorithm/mancunian-and-fantabulous-pairs/
- [16] https://www.hackerearth.com/practice/data-structures/stacks/basics-of-stacks/practice-problems/algorithm/coding-legacy-in-nirma-2/
- [17] https://www.hackerearth.com/practice/data-structures/stacks/basics-of-stacks/practice-problems/algorithm/nitish-and-pillars-0b5cfac4/
- [18] https://www.hackerearth.com/practice/data-structures/stacks/basics-of-stacks/practice-problems/algorithm/nearest-smaller-element-929558b4/

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- [19] https://www.hackerearth.com/practice/data-structures/stacks/basics-of-stacks/practice-problems/algorithm/monk-celebrating-checkpoint/
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- [22] https://www.hackerearth.com/practice/data-structures/stacks/basics-of-stacks/practice-problems/algorithm/signal-range/
- [23] https://www.hackerearth.com/practice/data-structures/stacks/basics-of-stacks/practice-problems/algorithm/monk-and-order-of-phoenix/
- [24] https://www.hackerearth.com/practice/data-structures/stacks/basics-of-stacks/practice-problems/algorithm/grandmaster/
- [25] https://www.hackerearth.com/practice/data-structures/stacks/basics-of-stacks/practice-problems/algorithm/fight-for-laddus/

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- [02] https://www.hackerearth.com/practice/data-structures/queues/basics-of-queues/practice-problems/algorithm/monk-and-chamber-of-secrets/
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- [04] https://www.hackerearth.com/practice/data-structures/queues/basics-of-queues/practice-problems/algorithm/number-recovery-0b988eb2/
- [05] https://www.hackerearth.com/practice/data-structures/queues/basics-of-queues/practice-problems/algorithm/little-monk-and-goblet-of-fire/
- [06] https://www.hackerearth.com/practice/data-structures/queues/basics-of-queues/practice-problems/algorithm/weird-planet-2000a170/



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