Competitive Programming
Science Honors Program (SHP)
Session 2

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Saturday, October 10, 2026

Built-in Data Structures

- vector
- queue
- stack
- deque
- priority_queue
- set
- map

vector

- **Array, but resizable (Dynamic Array)**

- [], push_back, pop_back, clear, size, empty

Practice with vector

queue

- **FIFO (First In First Out)**

- push, front, pop, clear, size, empty

- Typically used for Breadth First Search (BFS)
  - we will see them later!

Practice with queue

stack

- **Last In First Out (LIFO)**

- push, top, pop, clear, size, empty

- Typically, used for Depth First Search (DFS)
  - we will see them later!

Practice with stack

deque

- **Double-ended**

- [], push_back, push_front, pop_back, pop_front, clear, size, empty

- Typically used for 0/1 Breadth First Search (0/1 BFS)
  - we will see them later!

Practice with deque

priority_queue

- **queue with priority**

- push, top, pop, clear, size, empty

- Typically used for Dijkstra
  - we will see them later!

Practice with priority_queue

Graph Traversal Summary

Algorithm	**Container**
Breadth First Search (BFS)	queue
Depth First Search (DFS)	stack
0-1 BFS	deque
Dijkstra	priority_queue

set

- store unique elements following a specific order.

- insert, find, clear, erase, size

- Typically used for de-duplicating elements.
- Typically used for find elements quickly (logarithmic).

Practice with set

map

- {key, value} pairs, following a specific order.
- [], find, clear, erase, size
- Typically used for counting **frequency** of each elements.

Practice with map


BREAK

Group Exercise

- You may work in groups with those sitting near you.
- Each person must submit their own solutions.
- You have **75 minutes**.
- Afterward, you will present your solution!


THANK YOU