CS2040S Tutorial 7

AY 24/25 Sem 2 — github/omgeta

Q1. (a) $[26, 0, 19, 2, 0, 5, 12]$

(b) $[26, 0, 19, 2, 0, X, X]$

(c) $[A, B, 0, 0]$

Q2. HashMap storing counts, elements with count 2 are intersection, all elements in the HashMap are union. Time: $O(|A| + |B|)$

Q3. Naive: iterate through each subarray starting with i, returning true if running average is k. Efficient: subtract k from each element and calculate the prefix-sum (i.e. find complement array), then any duplicates indicate subarray found.

Q4. (a.) QuickSelect in $O(n)$

(b.) Maintain a MinHeap of $n - k$ elements, if the next element is lesser than the min element (i.e. kth largest), then discard it, else add the previous min and swap the next into the minHeap head

Q5. (a.) *push*: push to stack 1
pop: pop from stack 2, if stack 2 is empty pop all elements from stack 1 and transfer to stack 2

(b.) *push*: worst-case and amortized $O(t)$
pop: worst-case $O(n)$ when transferring elements, amortized $O(s)$

Q6. In each node, store the minimum of the existing elements.