COMP 352: Data Structures and Algorithms

Assignment 2 on Stacks

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Question 1:

1. No it is not possible for all 3, one of them must have an O(n) complexity **sometimes**. for the max method you must keep track of the max value inside a variable in the stack class (to avoid looping through the stack each time). Something similar to the size(). Here’s an implementation in java:

public class StackWithMax {  
  
 private int[] data;  
 int pointer;  
 int size;  
 int max; // <---- This variable is important  
  
 /\* Unnecessary Implementation details hidden \*/  
  
 public void push(int number) {  
 data[pointer++] = number;  
 size++;  
  
 if (number > max) // <---- This part is really important for max()  
 max = number;  
 }

public void pop() {  
 int to\_remove = data[pointer];  
 data[pointer--] = 0;  
 size--;  
  
 // If the element to remove is also the max  
 // Then we have to recalculate the max  
 int current\_max = Integer.MIN\_VALUE;  
 if (to\_remove == max) {  
  
 for (int temp : data) {  
 if (temp > current\_max)  
 current\_max = temp;  
 }  
  
 max = current\_max;  
 }  
  
 }  
  
 public int max() {  
 return max;  
 }  
}

Question 2: