Additional Problems for Assignment 7

1. New York has many tall buildings, but only some of them have a clear view of Hudson River. Suppose we are given an array $A[1, \ldots, n]$ that stores the height of n buildings on a city block, **indexed from east to west**. Building i has a good view of Hudson River if and only if every building to the **west** of i is shorter than i.

   Here is an algorithm that computes which buildings have a good view of Hudson River. What is the running time of this algorithm?

Algorithm 1 GoodView($A[1, \ldots, n]$)

1: Initialize a stack S;
2: **for** $i = 1, \ldots, n$ **do**
3:     **while** S is not empty and $A[i] > A[top(S)]$ **do**
4:         Pop(S);
5:     **end while**
6:     Push(S, i);
7: **end for**
8: **return** S.

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2. Describe how to implement a queue using two stacks and $O(1)$ additional memory, so that the amortized time for any enqueue or dequeue operation is $O(1)$. The only access you have to the stacks is through the standard subroutines Push and Pop.