class Solution:

def largestRectangleArea(self, heights: List[int]) -> int:

n = len(heights)

stack = []

next\_smaller\_to\_left = [-1] \* n

next\_smaller\_to\_right = [n] \* n

for i in range(n):

while stack:

if stack[-1][-1] < heights[i]:

next\_smaller\_to\_left[i] = stack[-1][0]

stack.append((i, heights[i]))

break

else:

stack.pop()

if not stack:

stack.append((i, heights[i]))

stack = []

for i in range(n - 1, -1, -1):

while stack:

if stack[-1][-1] < heights[i]:

next\_smaller\_to\_right[i] = stack[-1][0]

stack.append((i, heights[i]))

break

else:

stack.pop()

if not stack:

stack.append((i, heights[i]))

widths = [next\_smaller\_to\_right[i] - next\_smaller\_to\_left[i] - 1 for i in range(n)]

ans = max(widths[i] \* heights[i] for i in range(n))

return ans