**Largest rectangle in a histogram**

#include<bits/stdc++.h>

vector<int> nextSmaller(vector<int>& arr, int n)

{

stack<int> st;

st.push(-1);

vector<int> result(n);

for (int i = n - 1; i >= 0; i--)

{

int curr = arr[i];

while (st.top() != -1 && arr[st.top()] >= curr)

{

st.pop();

}

result[i] = st.top();

st.push(i);

}

return result;

}

vector<int> prevSmaller(vector<int>& arr, int n)

{

stack<int> st;

st.push(-1);

vector<int> result(n);

for (int i = 0; i < n; i++)

{

int curr = arr[i];

while (st.top() != -1 && arr[st.top()] >= curr)

{

st.pop();

}

result[i] = st.top();

st.push(i);

}

return result;

}

int largestRectangle(vector<int>& heights)

{

int n = heights.size();

vector<int> next(n);

next = nextSmaller(heights, n);

vector<int> prev(n);

prev = prevSmaller(heights, n);

int area = INT\_MIN;

for (int i = 0; i < n; i++)

{

int l = heights[i];

if (next[i] == -1)

{

next[i] = n;

}

int b = next[i] - prev[i] - 1;

int newArea = l \* b;

area = max(area, newArea);

}

return area;

}