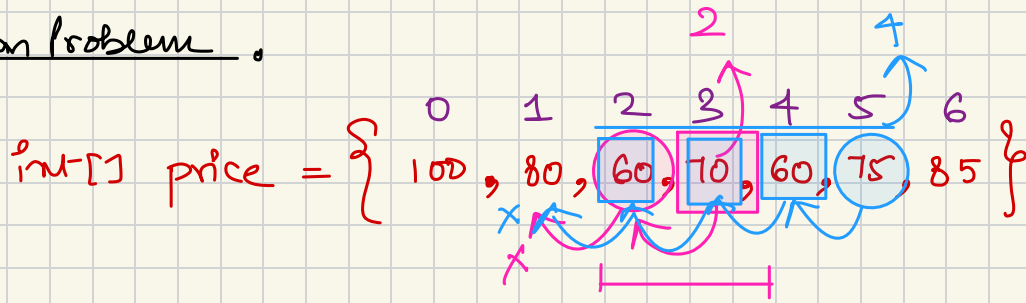




Agenda

- Stock span Problem → Medium
- largest Area histogram } → Hard
- Celebrity Problem → Easy / Medium

Stock span problem



span: no. of prev. consecutive days for which stock price less than equal to current day price

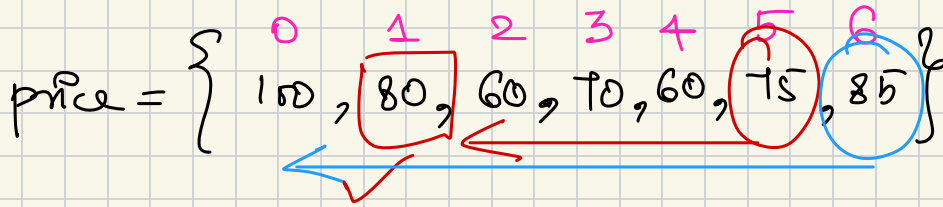
NOTE: We inc. curr. day in the span

if price = { 100, 80, 60, 70, 60, 75, 85 }

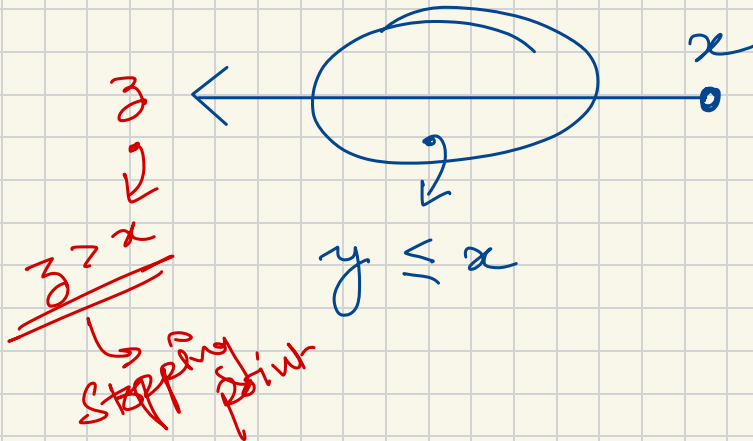
if span = { 1, 1, 1, 2, 1, 4, 6 } ✓

Brute Force

o Nested loop $TC: O(N^2)$
 $SC: O(1)$ }



next greater element on left }



$$\text{price} = \left\{ \overset{0}{100}, \overset{1}{80}, \overset{2}{60}, \overset{3}{70}, \overset{4}{60}, \overset{5}{75}, \overset{6}{85} \right\}$$

$$\text{ngeli} = \left\{ -1, 0, 1, 1, 3, 1, 0 \right\}$$

$$\left\{ 1, 1, 1, 2, 1, 4, 6 \right\} \rightarrow \boxed{\text{span}}$$

$$\text{span} = i - \text{ngeli}[i];$$

Steps

• get ngeli

• Calc span

TC: $O(N)$

TC: $O(N)$

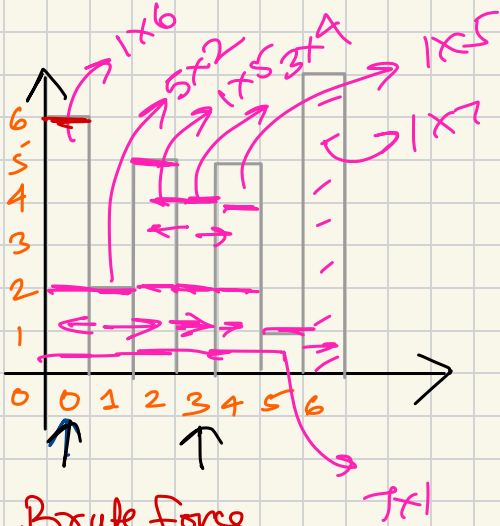
TC: $O(N)$

SC: $O(N)$

SC: $O(N)$

Largest Area Histogram

find rectangle with max^m area.



Brute Force

TC: $O(N^2)$
SC: $O(1)$

int list[] = { 6, 2, 5, 4, 5, 1, 7 }

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

{
 int minH = ∞ ;
 for (int j = i; j < n; j++)

{
 width = j - i + 1;

 minH = min(minH, arr[j]);

 maxArea = max(maxArea, minH * width);

}

$\text{int}[] \text{list} = \{ 6, 2, 5, 4, 5, 1, 7 \}$

```

for (int i = 0 → n)
{
    int minH = top;
    for (int j = i → n)
    {
        int w = j - i + 1;
        minH = min(minH, arr[j]);
        maxA = max(maxA, minH * w);
    }
}

```

next smaller elem
on right

next smaller ele
left

$$\text{hist}[] = \left\{ \overset{0}{6}, \overset{1}{2}, \overset{2}{5}, \overset{3}{4}, \overset{4}{5}, \overset{5}{1}, \overset{6}{7} \right\}$$

$$\text{user}i = \{ 1, 5, 3, 5, 5, 7, 7 \}$$

$$\text{res}li = \{ -1, -1, 1, 1, 3, -1, 5 \}$$

$$\text{width} = \underline{\underline{rb - lb - 1}}$$

$$w = \{ 1, 5, 1, 3, 1, 7, 1 \}$$

Celebrity Problem

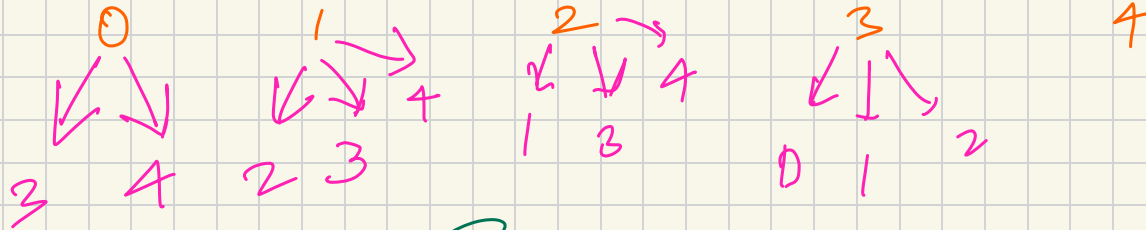
$$M[i][j] = \begin{matrix} & \begin{matrix} 0 & 1 & 2 & 3 & 4 \end{matrix} \\ \begin{matrix} 0 \\ 1 \\ 2 \\ 3 \\ 4 \end{matrix} & \begin{bmatrix} 0 & 0 & 0 & 1 & 1 \\ 0 & 1 & 1 & 1 & 1 \\ 0 & 1 & 1 & 1 & 1 \\ 1 & 1 & 1 & 1 & 0 \\ 0 & 0 & 0 & 0 & 1 \end{bmatrix} \end{matrix}$$

$$M[i][j] = 0$$

$i^{th} \nrightarrow j^{th}$

$$M[i][j] = 1$$

$i^{th} \rightarrow j^{th}$



Celeb find?

{ celeb is a person who is known by everyone but doesn't anyone

NOTE

Can we have more than one celeb, in a gathering

No!

Celeb

- doesn't know anyone
i.e. whole row should be zero
- known by everyone
i.e. whole col should be one

Brute Force

TC: $O(N^2)$ } check for every individual.
SC: $O(1)$

~~0, 4~~

~~$O(N)$~~ $\rightarrow O(N)$ ✓
 ~~$O(N)$~~ $\rightarrow O(N)$ ✓

3
Stack

3, 9

potential

0, 1

\rightarrow 0 doesn't know 1 hence 1 can never be celeb

$M[][] =$

	0	1	2	3	4
0	0	0	0	1	1
1	0	1	1	1	1
2	0	1	1	1	1
3	1	1	1	1	0
4	0	0	0	0	1

~~0, 3~~