Burst Balloon

You are given `n` balloons, indexed from `0` to `n - 1`. Each balloon is painted with a number on it represented by an array `nums`. You are asked to burst all the balloons.

If you burst the i^{th} balloon, you will get `nums[i - 1] * nums[i] * nums[i + 1]` coins. If `i - 1` or `i + 1` goes out of bounds of the array, then treat it as if there is a balloon with a `1` painted on it.

Return *the maximum coins you can collect by bursting the balloons wisely.*

$\{ \cancel{3}, \cancel{1}, \cancel{5}, \cancel{8} \}$

max^m

3 1 5 8

$1 \times 3 \times 1 = 3$

$1 \times 1 \times 5 = 5$

$1 \times 5 \times 8 = 40$

$1 \times 8 \times 1 = 8$

56

3 ~~1~~ 5 8

$3 \times 1 \times 5 = 15$

3 ~~5~~ 8

$3 \times 5 \times 8 = 120$

3 ~~8~~

$3 \times 8 \times 1 = 24$

3 ~~1 8 5~~

$1 \times 3 \times 1 = 3$

1

15

24

3

120

162

Idea to solve the problem is to think in backward fashion

let say $\{3, \cancel{1}, 5, 8\} \rightarrow 3 \times 1 \times 5 = 15$

$\{3, \cancel{5}, 8\} \rightarrow 3 \times 5 \times 8 = 120$

$\{\cancel{3}, 8\} \rightarrow 1 \times 3 \times 8 = 24$

$\{8\} \rightarrow 1 \times 8 \times 1 = 8$

$1 \{ \cancel{3}, 1, \cancel{5}, \cancel{8} \} 1 \rightarrow 1 \times 8 \times 1 = 8$

$i \qquad j$

$1 \{3, 8\} \qquad 1 \{1, 8\} \qquad 1 \{5, 8\}$

$1 \times 3 \times 8 = 40$

$1 \{ \cancel{3} \; 1 \; 5 \} 8$

$3 \times 5 \times 8 = 120$

$3 \{1, 5\} 8$

$3 \times 1 \times 5 = 15$

$3 \{1\} 5$

Recursive function

if (i > j) return 0;

for (k = i, k <= j ; k++)

$cost = arr[i-1] \times arr[k] \times arr[j+1]$

$+ f(i, k-1) + f(k+1, j)$

}

1 {3, 1, 8, 5} 1

5 { × } 1

- While using partition in by finding last burst ballon the partition are independently as it depends on extreme left and extreme right element.

It is Similar to MCM problem.