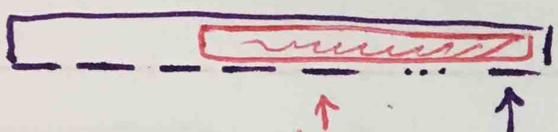
1 Define M_i as the maximum multiply of first i elements of the sequence which ends in d_i



the sub seq. with max. mult. ending with d_i

d_i

$$M_i = \max\{ d_i \times M_{i-1} , d_i \}$$

in other words $M_i = \begin{cases} d_i & \text{if } M_{i-1} < 1 \\ d_i \times M_{i-1} & \text{other wise} \end{cases}$

$\boxed{\text{initial}}$ $M_1 = d_1$

$\boxed{\text{answer}}$ $= \max\{ M_1, M_2, \dots, M_n \}$

Example:

$$\frac{1}{2} \quad \boxed{6 \quad \frac{1}{3} \quad 6} \quad \frac{1}{2}$$

$$M_1 = d_1 = \frac{1}{2}$$

$$M_2 = \max\left\{\frac{1}{2}\times 6, 6\right\} = 6$$

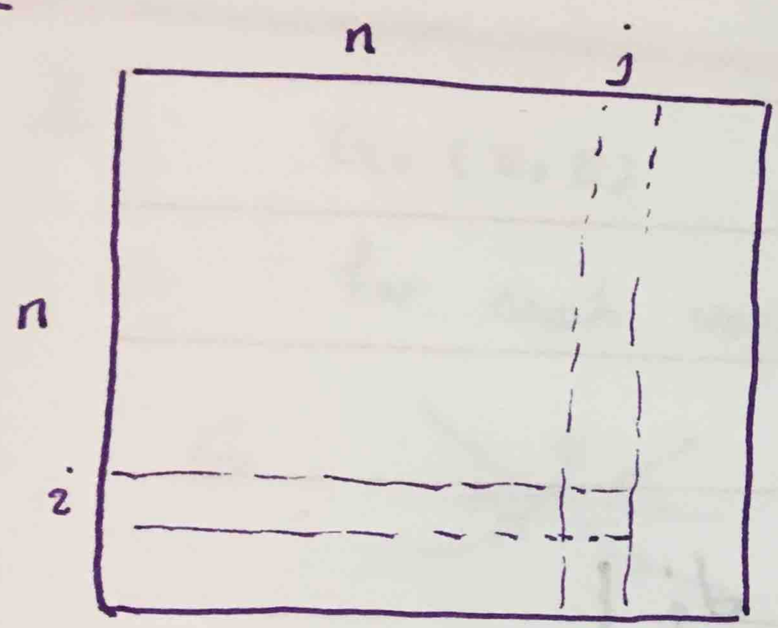
$$M_3 = \max\left\{6\times\frac{1}{3}, \frac{1}{3}\right\} = 2$$

$$M_4 = \max\left\{2, 2\times 6\right\} = 12$$

$$M_5 = \max\left\{12\times\frac{1}{2}, \frac{1}{2}\right\} = 6$$

$$\text{answer} = \max\left\{6, 2, 12, 6, \frac{1}{2}\right\} = 12$$

2



M is our $n \times n$ grid

$M(i,j)$: element in row i and column j

$S(i,j)$: size of the biggest sub-square which ends with $M(i,j)$

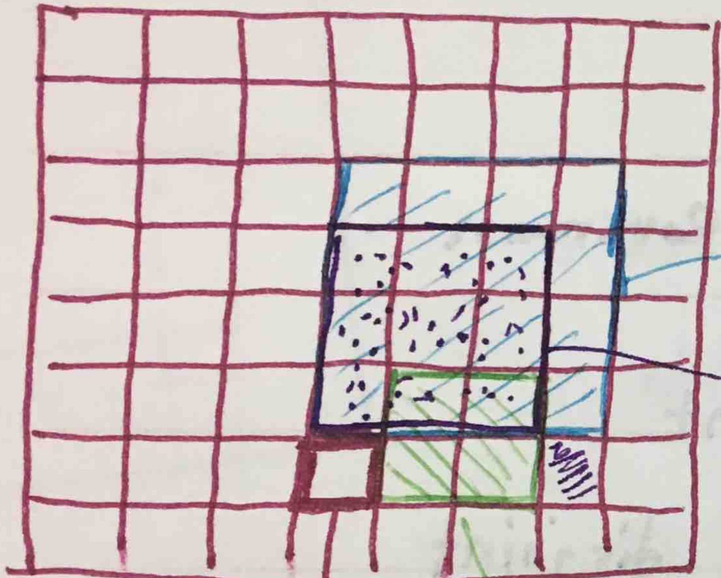
$\boxed{\text{initial}}$ for all $1 \leq i \leq n$ $\quad S(i,0) = M(i,0)$

for all $1 \leq j \leq 1$ $\quad S(0,j) = M(0,j)$

$$S(i,j) = \left(\min\{S(i-1,j),\ S(i,j-1),\ S(i-1,j-1)\} + 1\right) \times M(i,j)$$

$\boxed{\text{answer}}$ max of all $S(i,j)$ for $1 \leq i,j \leq n$

* Why minimum?



if $M(i,j) = 0 \longrightarrow S(i,j) = 0$

otherwise

$$S(i,j) = \underbrace{\min\{S(i-1,j),\ S(i,j-1),\ S(i-1,j-1)\}}_{K} + 1$$

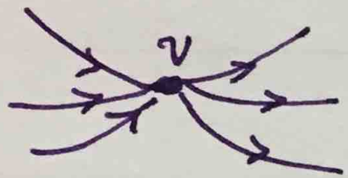
There is at least one row that the number of its unit squares is at most K.

3

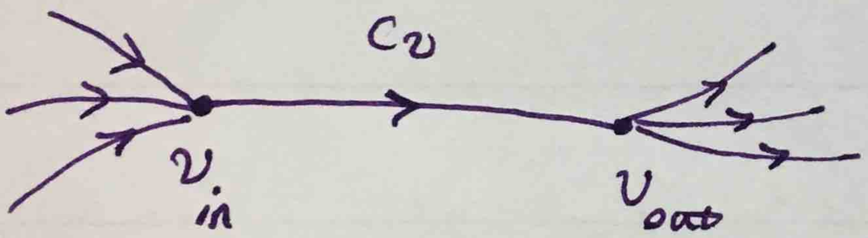
$G = (V, E)$

for each vertex $v \in V$ with capacity c_v

G



Put two vertice v_{in} and v_{out} in G'



Run max-flow on G'

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