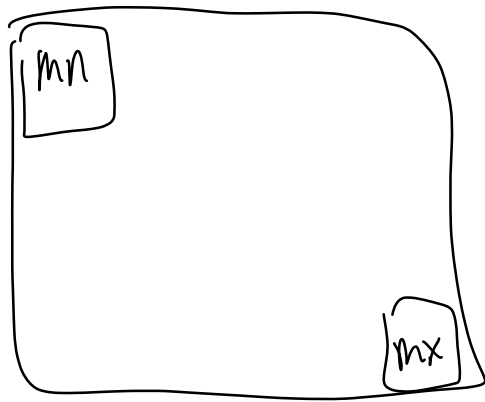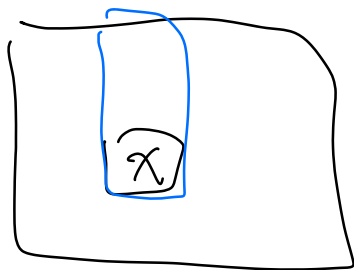# Binary search over value space
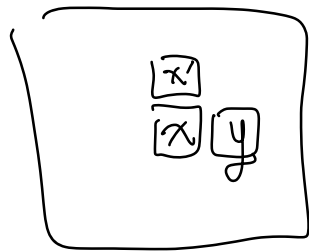

Goal: given a mid,
we want to find # of nums
≤ mid in this matrix

Case 1: $x \leq mid$

Then **blue** part is $\leq$ mid

Case 2: $x > $ mid

Then we have to move to x'

Observe that: $y \geq x$,

so if $x > $ mid $\Rightarrow y \geq x > $ mid

$\Rightarrow y > $ mid

$\Rightarrow$ our row pointers will not walk backward!