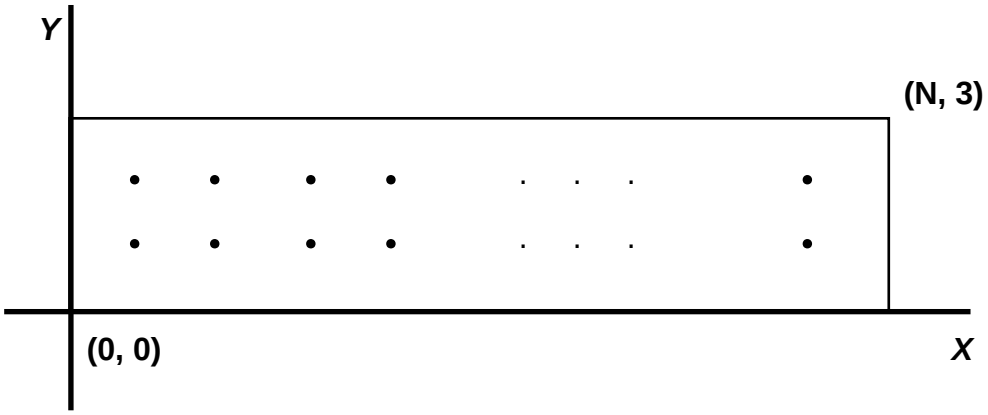
MASSACHUSETTS MATHEMATICS LEAGUE
CONTEST 1 - OCTOBER 2015 SOLUTION KEY

Team Round - continued

F)



There are two rows of lattice points, each of which contains $(N-1)$ points.

Consider points in the same row.

Each of the $(N-1)$ points must be connected to a point at least 2 units away.

The first point may be connected to the 3rd, 4th, 5th, etc. Moving only from left to right to avoid duplication, the second may be connected to the 4th, 5th 6th, etc.

The next to the next to last point may only be connected to the last point.

Thus, we have $(N-3)+(N-4)+...+1$ segments.

This is an arithmetic sequence with a sum of $\frac{(N-3)(N-2)}{2}$

$\Rightarrow$ a total of $(N-3)(N-2)$ for 2 rows.

Consider points from different rows.

Any point in the bottom row can be connected to any point in the top row, excluding the point directly above it, producing $(N-1)(N-2)$ new segments.

Therefore, $(N-3)(N-2)+(N-1)(N-2)=(N-2)(2N-4)=450$

$\Rightarrow (N-2)^2=225 \Rightarrow N=15+2=\underline{\mathbf{17}}$