1. Problem definition

Given a number $n \in \mathbb{N}$, find the minimal number $k \in \mathbb{N}$ such that there are n sets $A_1, ..., A_n$ containing numbers in $[k]$, i.e $A_i \subseteq \{1, ..., k\}$ satisfying:

$$|A_i \cap A_j| = |i - j| \text{ for all } 1 \leq i < j \leq n$$

For example, for $n = 4$, the answer would be $k = 5$, with which we could pick the 4 sets as:

$A_1 = \{1, 2, 3, 4\}$
$A_2 = \{1, 5\}$
$A_3 = \{1, 2\}$
$A_4 = \{1, 3, 4, 5\}$

or a more visual alternative:

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A₁:  1  2  3  4
A₂:  1           5
A₃:  1  2
A₄:  1     3  4  5
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