HPIcoin Heist

Input file:	`standard input`
Output file:	`standard output`
Time limit:	1 second
Memory limit:	256 megabytes

Hackerman is on a quest to hack three computers at three virtual locations in an N by N grid filled with obstacles to steal HPIcoins. Starting at the top left corner, Hackerman can only move in the four cardinal directions, but improves after hacking each computer. After hacking the first computer, he gains the ability to move diagonally. After hacking the second computer, he can skip over obstacles directly to the north, south, east, or west of him. After hacking the third computer, he has successfully pulled off his HPIcoin heist. However, Hackerman needs to finish hacking before the Programming Police arrive. Help Hackerman find the shortest amount of time it takes to hack all three computers.

Input

Line 1: N
Lines 2...N+1: Line $i+1$ describes row i of the virtual grid; 0 represents an empty space, 1 represents an obstacle, 2 is the location of a computer

Output

Line 1: Minimum amount of time for Hackerman to hack all three computers

Examples

standard input	standard output
6 0 0 0 0 1 2 0 1 1 2 1 0 0 1 0 0 1 0 0 1 0 1 1 0 0 1 0 0 0 0 0 2 1 0 0 0	12
6 0 0 0 0 1 2 0 1 1 2 1 0 0 1 0 0 1 0 0 1 0 1 1 0 0 1 1 0 0 0 0 2 1 0 0 0	15

Note

$6 \leq N \leq 36$
Asume that Hackerman cannot reach two computers at the same time