FFXIV: Wondrous Trails

Overview

Wondrous Tails is a weekly activity of the famous MMORPG Final Fantasy XIV that allows players to complete old content to earn rewards. Each week the player will receive a journal containing some objectives and a grid of 4 rows and 4 columns. When the player completes an objective, a seal will be stamped into a random empty cell of the grid. The player will be rewarded according to the pattern of the seals after collecting 9 seals in the journal

To be more precise, for each row/column/diagonal of the grid (by the diagonals of the grid we mean both the main diagonal and the anti diagonal), if all its 4 cells are filled with a seal we say this row/column/diagonal forms a line. For top level award a grid containing at least 3 lines is needed.

It's obvious that for a randomly generated seal pattern it's almost impossible to receive the top award, so the players are allowed to rearrange the pattern in some way. For the simplicity of this problem, we assume that the player can perform the following operation on a grid with 9 seals any number of times: select one seal and move it to any empty cell.

Given a grid with 9 seals, what's the minimum number of operations one need to perform to change it into a grid with at least 3 lines?

Format

Example input (which is actually the pattern shown in the figure above):

```
[[1, 1, 0, 0], [0, 1, 0, 0], [1, 1, 0, 0], [1, 1, 1, 1]]
```
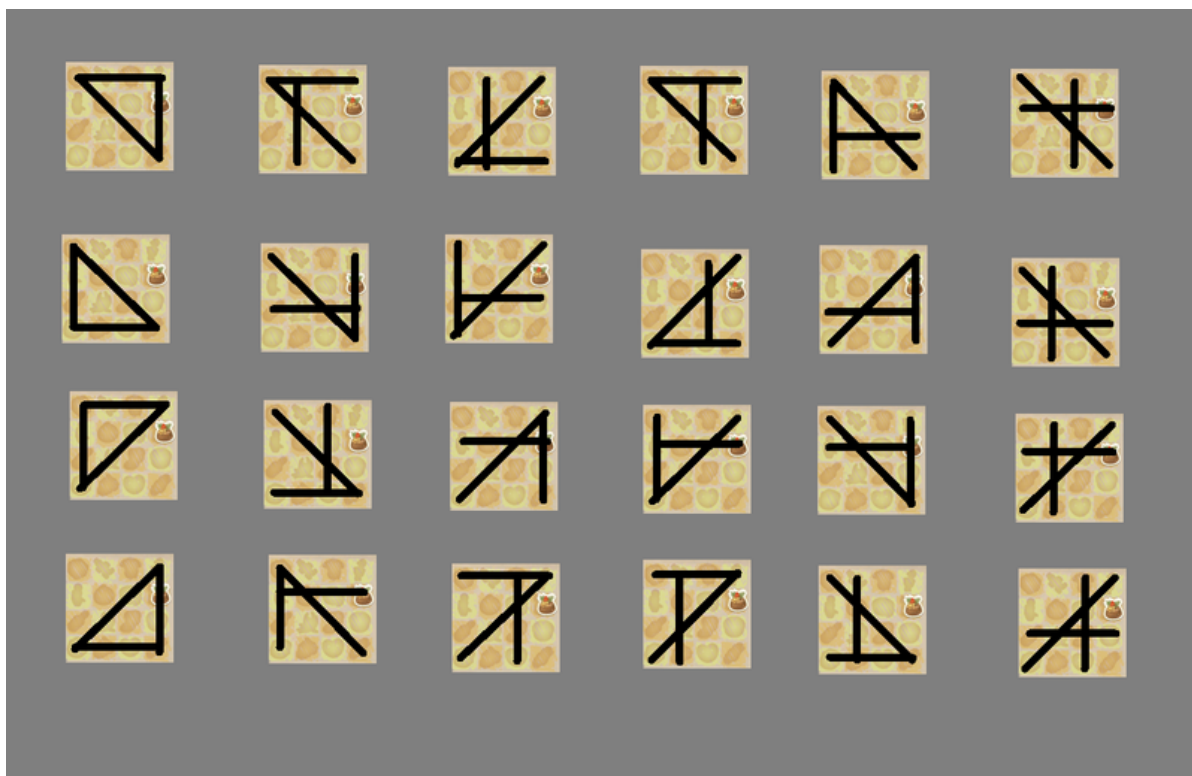
Example output:

```
1
```

Example explanation: We just need to move the red wine pattern from the first cell of the third row to the third cell.

Hint

- The following figure shows all the possible layouts of 3 lines.

- Pay attention to crossover grids, which may lead to incorrect answers for some of the testcases if not handled properly.

Grading Criteria

- Please use loop statements to solve the problem to get all the points. If you hard code 24 cases, you will only get half of the points.
- Online submission closes at 20:30. After submission, please ask TA to check your code and answer the corresponding questions to complete the test. The readability of the code will also affect the score (for example, if you use a lot of variables, please use meaningful variable names whenever possible).
- You can submit up to 5 times. After this threshold, each additional submission is penalized by 20% of points.
- The code you submit will be archived and kept by the university, so please be mindful of academic integrity.

Code Template

```python
#!/usr/bin/env python3
def solve(data):
    ans = 16

    # implement your algorithm here

    return ans


def main():
    data = [[1, 1, 0, 0], [0, 1, 0, 0], [1, 1, 0, 0], [1, 1, 1, 1]]
    print(solve(data))


if __name__ == "__main__":
    main()
```