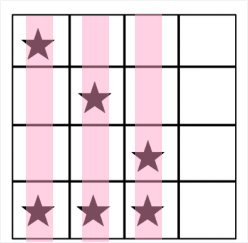
Hint 3

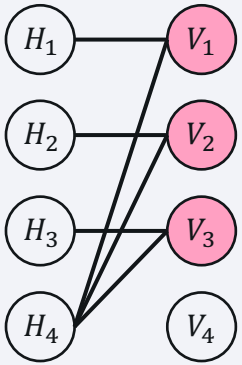
There are **several ways** to solve the final exercise. In this hint, I will explain an approach that is general and naive.
The key idea is to convert an Asteroids problem into a so-called Vertex Cover problem.

How to encode an Asteroids problem into a graph

Asteroids problem



Graph



Each node represents a row/column.
- H_i represents i-th row.
- V_j represents j-th column

Each edge represents an asteroid.
- Put an edge between node H_i and node V_j if there is an asteroid at (i, j)

In the left example, choosing $\{V_1, V_2, V_3\}$ can cover all the edges. The solution exactly corresponds to shooting beams at column1, 2, and 3 vertically in the Asteroids problem.

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Then, create the following 2 oracles and combine into one.
- Oracle 1: Are all the edges covered by chosen nodes?
- Oracle 2: Is the number of chosen nodes 3?

Nodes that satisfy Oracle1 and Oracle 2 represent the solution for the Asteroids problem.
Once you know how to implement the above, you can tell whether a given Asteroids problem is solvable or not. You're almost there! Good luck!!