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**COMP9101 Ass04**

4. Use max flow algorithm to solve the following problem. You are given a usual $n \times n$ chess board with $k$ white bishops on the board at the given cells $(a_i, b_i)$, $(1 \leq a_i, b_i \leq n,\ 1 \leq i \leq k)$. You have to determine the largest number of black rooks you can place on the board so that no two rooks are in the same row or in the same column or are under the attack of any of the $k$ bishops (recall that bishops go diagonally).(25 pts)

## Q4.

This question is similar as Q2, we can build a bipartite graph, the left side is each row(ri), and the right side is each column(ci). Therefore the (ri, ci) shows the cell on the chess board. Because according to the requirement, each black rook should not place on the same row or column. We can set the super source connect to the rows, and the capacity of each edge is 1, and we can also set the super sink connect to the columns, which the capacity of each edge is also 1. Then we should decide if we can connect each row and column, if the white bishops cannot attack the black rooks, we can connect current row and column. And we can run the max-flow algorithm, to calculate the most number of the black rooks. The time complexity relies on the size of chess board, which is O(n^3).