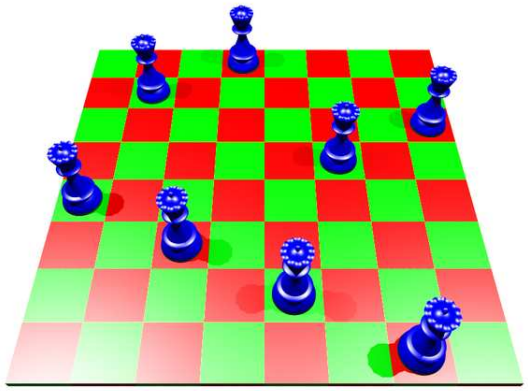
Lecture 24: Determinants

The following matrix is a solution to the **eight queens puzzle**. Each entry 2 represents a **queen**. No queen can catch any other queen in chess. What is the determinant of this matrix? Make sure to mention all tools you need to find the answer.

$$\begin{bmatrix} 0 & 0 & 0 & 2 & 0 & 0 & 0 & 0 \\ 0 & 2 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 2 \\ 0 & 0 & 0 & 0 & 0 & 2 & 0 & 0 \\ 2 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 2 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 2 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 2 & 0 \end{bmatrix} .$$



Here are some true false problems:

1 Assume $A = -A^T$ and A is a 3×3 matrix. Then $\det(A) = 0$.

2 The determinant of a rotation matrix in two dimensions is always 1.

3 The determinant of a reflection matrix in two dimensions is always -1.

4 If a matrix has integer entries, then the determinant is an integer.

5 If the determinant is an integer, then the matrix has integer entries.

6 If a matrix has positive entries, then it has a positive determinant.