If 8 rooks are randomly placed on a chess board, compute the probability that none of the rooks can capture any of the other rooks in one move.

**Solution**

There are $4,426,165,368$ ways to place 8 rooks on a standard $8 \times 8$ chess board:

$$\binom{64}{8} = \frac{64!}{8!(64 - 8)!} = 4,426,165,368$$

In order for a rook to capture another rook, they must been in the same row or column. Therefore, each row and column must only contain one rook. There are $40,320$ ways this could happen:

$$8! = 40,320$$

Then, the probability is:

$$\frac{40,320}{4,426,165,368} = 9.10947 \times 10^{-6}$$