

**MATH 113: DISCRETE STRUCTURES**  
**MONDAY WEEK 1 HANDOUT**

*Question 1* (Non-attacking rooks). Rooks are chess pieces which move vertically and horizontally. We say that two rooks are attacking each other if they are in the same rank (*i.e.* row) or file (*i.e.* column). Is it possible to place 8 rooks on a standard  $8 \times 8$  chessboard so that no two rooks are attacking each other? In how many different ways can non-attacking rooks be placed on the board?

*Question 2* (Monotonic paths). A path on a square grid is called *monotonic* if it proceeds only by single steps right or up. On a  $4 \times 4$  (or  $n \times k$ ) grid, how many distinct monotonic paths go from the bottom left corner to the top right corner?