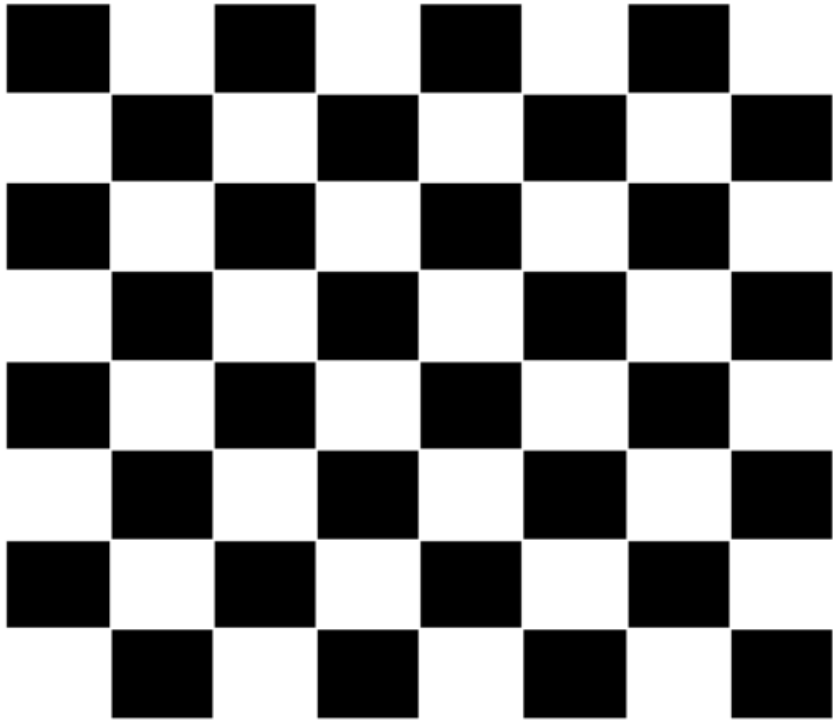
CSIT113
Problem Solving

Workshop – Week 6

Non-Attacking Kings

Place the greatest possible number of kings on an 8 × 8 chessboard so that no two kings are placed on adjacent—vertically, horizontally, or diagonally—squares.



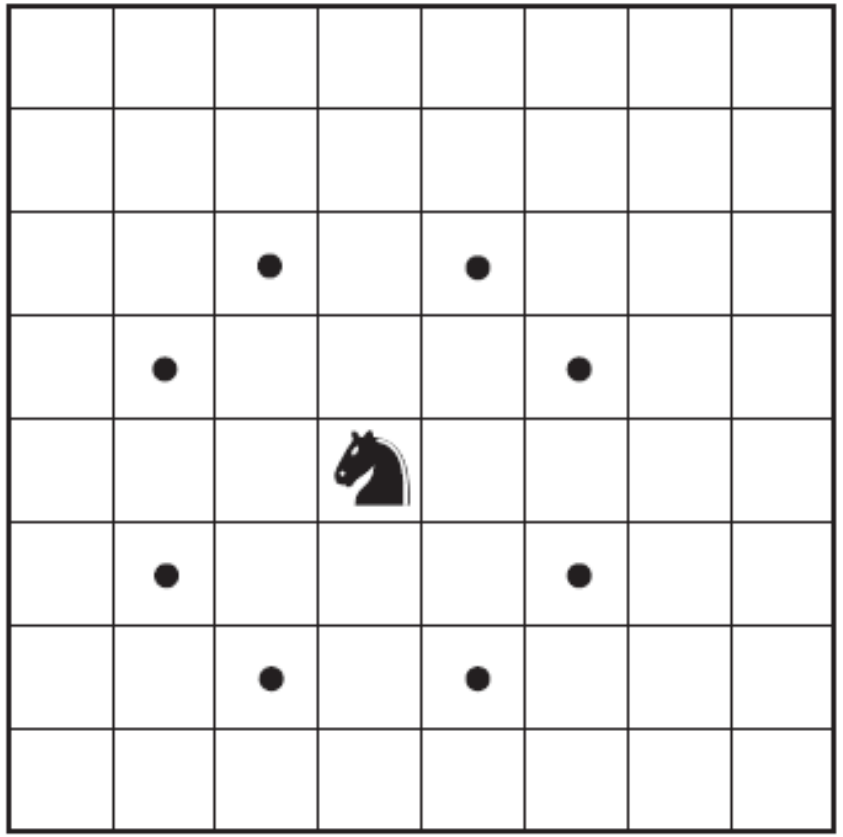
Bridge crossing at night

- A group of four people, who have one flashlight, need to cross a rickety bridge at night.
- A maximum of two people can cross the bridge at one time, and any party that crosses (either one or two people) must have the flashlight with them. The flashlight must be walked back and forth; it cannot be thrown.
- Person A takes 1 minute to cross the bridge, person B takes 2 minutes, person C takes 5 minutes, and person D takes 10 minutes.
- A pair must walk together at the rate of the slower person's pace.
- Find the fastest way they can accomplish this task.

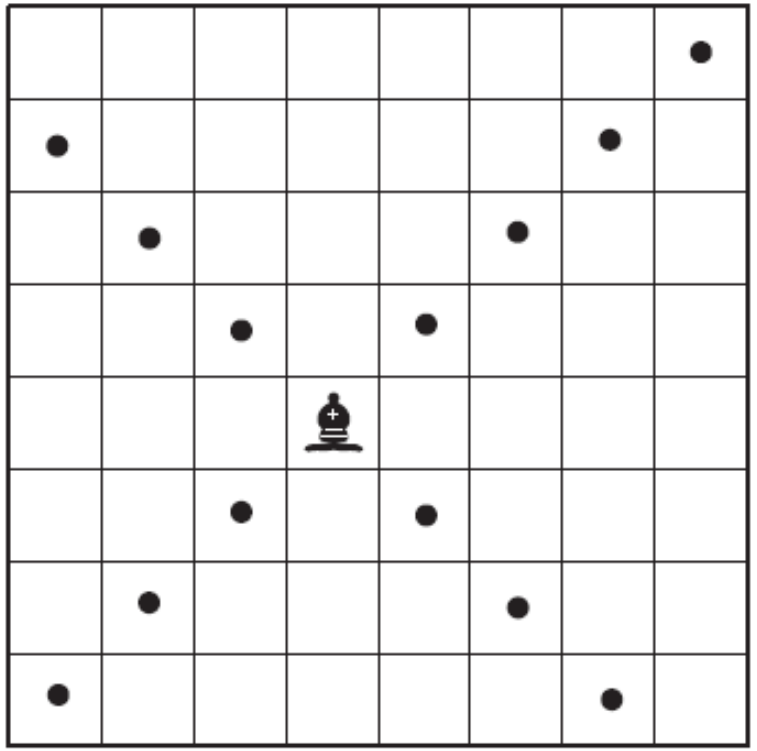
Chessboard colourings

For each of the following chess pieces, find the minimum number of colors needed to color an $n \times n$ chessboard ($n > 1$) so that no two pieces in question placed on two squares of the same color can threaten each other, i.e., after colouring the board, the piece mentioned in the question (wherever it be placed in the board) will have to make the next move to a square of different color.

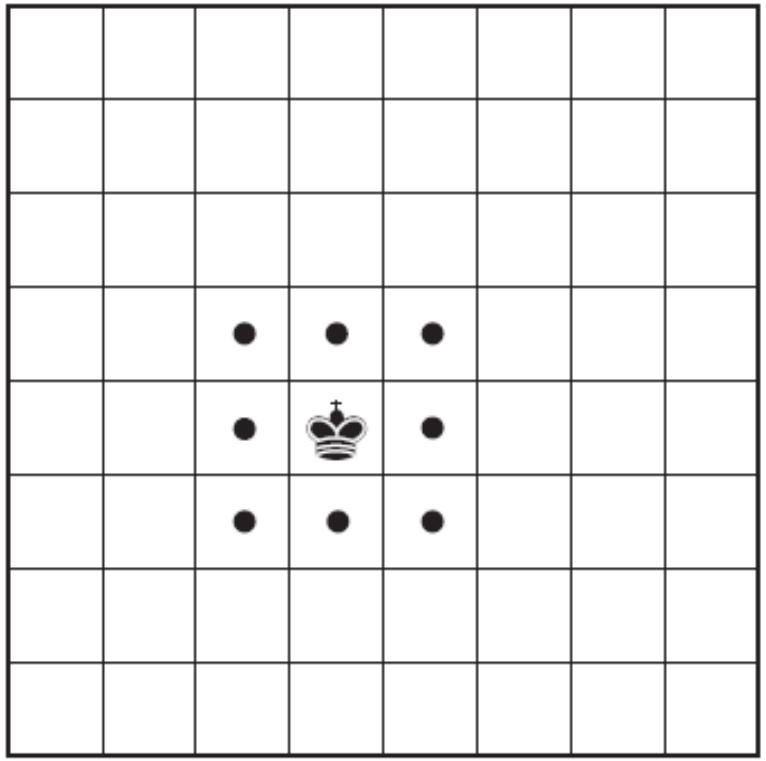
a) The knight. (The knight threatens any square that is two squares horizontally and one square vertically, or two squares vertically and one square horizontally from the square it occupies.)



b) The bishop. (The bishop threatens any square that is on the same diagonal.)



c) The king. (The king threatens any square adjacent to it horizontally, vertically, or diagonally.)



d) The rook. (The rook threatens any square in the same row or in the same column.)