Imperial College London
BUSINESS SCHOOL

MSc Business Analytics 2025/26
Optimisation and Decision Models
Wolfram Wiesemann

First Optimisation Prize: Continuous Sudoku

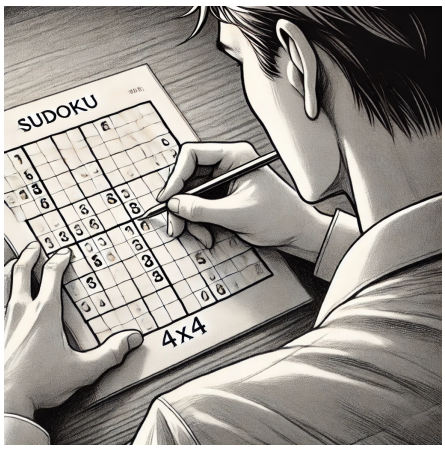
Consider a variant of the classical Sudoku game in which you are given the following 4x4 grid:

2			**3**
	1		
		4	
3			**1**

Your goal is to fill the empty cells with nonnegative continuous numbers such that each row and each column sums up to exactly 10.

Puzzle rules:

- **Row sums:** The sum of values in each row should be exactly 10.
- **Column sums:** The sum of values in each column should also be exactly 10.
- **Continuous values:** You can assign any nonnegative continuous values to the cells, as long as they satisfy the row and column sum conditions. In particular, different cells can contain the same values.



Goal:
Find values for each blank cell that satisfy all the given constraints. Unlike classical Sudoku, there is no objective function to maximise or minimise. Your challenge is to achieve a feasible solution that balances each row and column sum perfectly.

Hint:
Introduce decision variables x_{ij}, where i denotes the row and j the column in the above grid.