MATH3202/7232 Operations Research & Mathematical Planning 2020

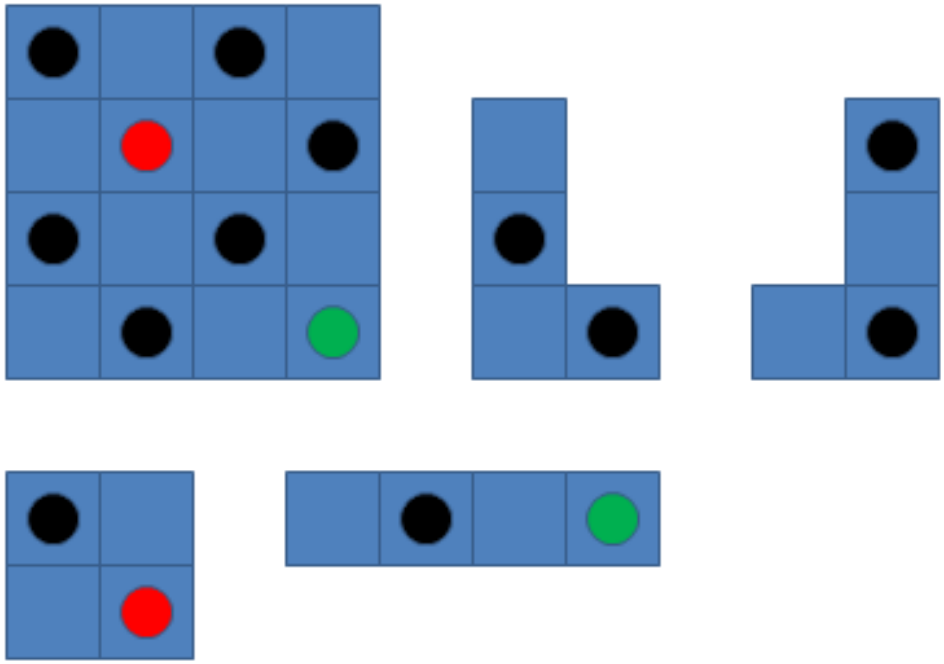
Tutorial 6 – Heist Puzzle

Many puzzles can be formulated as Integer Programming problems. Today we consider the Heist puzzle

http://www.youtube.com/watch?v=q-roBTkYC3I

(thanks to Luke Marshall for the suggestion). The full Heist has 13 pieces, 12 of them comprising 5 squares and 1 comprising 4 squares. The pieces are double sided with different patterns of "locks" and "gems" on each side. The challenge is to use the pieces to tile a specific 8 by 8 pattern. There are a number of patterns of increasing difficulty.

In order to make the data manageable, we will consider a smaller version of the puzzle with a 4 by 4 board and one-sided pieces, as shown below. The pieces can be rotated, but not flipped. This is easy to solve by hand but we will endeavour to come up with a general-purpose Integer Programming formulation that can be extended to solve larger problems.



1. Construct an Integer Programming formulation to solve this problem.

2. How can you use an IP solver to find all solutions?