Homework 12

CS41, Spring 2023 Due Friday, April 28

Describe how to construct mixed integer programs for each of the following problems you've seen before. For each one, you should specify a set of variables; whether each of the variables is restricted to $\mathbb{R}$, $\mathbb{Z}$, or $\{0, 1\}$; a set of linear constraints; a linear objective function; whether the objective function should be maximized or minimized; and, if the problem is a decision problem, a target value for the objective function. You may find it helpful to also describe the semantic meaning of each variable, but remember that this isn't part of the formal specification of an MIP.

For example, the following would be a correct solution to Q1b on Lab 12, which is similar to the problems here: For each user i, create a binary variable x_i and introduce the constraint $\sum_{j \in F_i} x_j \geq 3$. Minimize $\sum_i p_i \cdot x_i$ with target b.

1. The house building problem from HW9
2. CLIQUE-AND-IND from Lab 11
3. DOUBLE-SAT from Lab 11
4. 4SPACE from HW11