ISE 3230 Project

2024-11-26

Objective Function

Travel Cost

$$Travel\ \ Cost = i \sum j \sum (0.81 \cdot d_{ij} \cdot x_{ij})$$

Mowing Cost

$$Mowing\ \ Cost = i \sum t_i j \sum (x_{ij} \cdot 40)$$

Blade Change Cost

$$Blade\ Change\ Cost = i \sum j \sum (x_{ij} \cdot blade\_change\_cost_k \cdot (blade\_type_i \neq blade\_type_j))$$

Constraints

Each house has exactly one outgoing route:

$$\sum_{j=0}^{n} x_{ij} = 1 \quad \forall i$$

Each house has exactly one incoming route:

$$\sum_{i=0}^{n} x_{ij} = 1 \quad \forall j$$

No self-loops:

$$x_{ii} = 0 \quad \forall i$$

Eliminate sub tours:

$$y_i - y_j + n \cdot x_{ij} \leq n - 1 \quad \forall i, j \quad (i \neq j)$$

Garage:

$$\sum x_{0j} = 1 for\ all\ j -> Garage\ is\ starting\ point$$

$$\sum x_{i0} = 1 for\ all\ i -> Garage\ is\ ending\ point$$