Notes about Code for Routing

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1 TSP

1.1 Miller–Tucker–Zemlin (MTZ) formulation

$$
\begin{aligned}
&\min \sum_{i=1}^{n} \sum_{j=1, j\neq i}^{n} c_{ij} x_{ij} \\
s.t. \quad &\sum_{j=1, j\neq i}^{n} x_{ij} = 1 && i = 1, 2, \ldots, n \\
&\sum_{i=1, i\neq j}^{n} x_{ij} = 1 && j = 1, 2, \ldots, n \\
&u_j - u_i + n(1 - x_{ij}) \geq 1 && 1 \leq i \neq j \leq n \\
&x_{ij} \in \{0, 1\} && 1 \leq i \neq j \leq n \\
&u_i \in \{1, 2, \ldots, n\} && i = 1, 2, \ldots, n
\end{aligned}
$$

1.2 Dantzig–Fulkerson–Johnson (DFJ) formulation

$$
\begin{aligned}
&\min \sum_{i=1}^{n} \sum_{j=1, j\neq i}^{n} c_{ij} x_{ij} \\
s.t. \quad &\sum_{j=1, j\neq i}^{n} x_{ij} = 1 && i = 1, 2, \ldots, n \\
&\sum_{i=1, i\neq j}^{n} x_{ij} = 1 && j = 1, 2, \ldots, n \\
&\sum_{i \in S} \sum_{j \in S, j\neq i} x_{ij} \leq |S| - 1 && S \subset \{1, 2, \ldots, n\}, |S| \geq 2 \\
&x_{ij} \in \{0, 1\} && 1 \leq i \neq j \leq n
\end{aligned}
$$