Operations Research February 1, 2016 A

First and Last name _____

Exercise 1

f_{ij} = kWh arriving to distribution node $j \in D$ from generation plant $i \in P_j$

x_{jk} = kWh from distribution node $j \in D$ to customer $k \in C$

y_{jk} = 1 if the link between distribution node $j \in D$ and customer $k \in C$ is set up; 0 otherwise

δ_i = 1 if generation plant $i \in P$ is activated; 0 otherwise

$$\min \sum_{j\in D}\sum_{i\in P_j} c^I_{ij} f_{ij} + \sum_{j\in D}\sum_{k\in C}(c^{II}_{jk} x_{jk} + s_{jk} y_{jk}) + \sum_{i\in P} a_i \delta_i + \sum_{i\in P} g_i \sum_{j\in D: i\in P_j} f_{ij} \tag{1}$$

$$\sum_{j\in D} x_{jk} \geq q_k, \quad k \in C \tag{2}$$

$$\sum_{j\in D} y_{jk} \geq 2, \quad k \in C \tag{3}$$

$$x_{jk} \leq q_k y_{jk}, \quad j \in D, k \in C \tag{4}$$

$$\sum_{i\in P_j} f_{ij} - \sum_{k\in C} x_{jk} = 0, \quad j \in D \tag{5}$$

$$\sum_{i\in P_j} f_{ij} \leq cap_j \quad j \in D \tag{6}$$

$$\sum_{j\in D: i\in P_j} f_{ij} \leq p_i \delta_i \quad i \in P \tag{7}$$

$$f_{ij} \geq 0, \quad j \in D, i \in P_j \tag{8}$$

$$x_{jk} \geq 0, \quad j \in D, k \in C \tag{9}$$

$$y_{jk} \in \{0,1\}, \quad j \in D, k \in C \tag{10}$$

$$\delta_i \in \{0,1\}, \quad i \in P \tag{11}$$