BOZ780 Assignment 1

DS de Gouveia
15003079

Contents

1 Question 1 **1**

2 Question 2 **1**

References **2**

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1. Question 1

2. Question 2

Sets

I set of facility types $I \in (1, \ldots, 4)$ as (Golf, Swimming, Gymnasium, Tennis)
J set of sites $J \in (1, \ldots, 6)$

Parameters

d_{ij}	user days for facility i on site j	$i \in I, j \in J$
a_j	available land on site j in ft^2	$j \in J$
c_i	construction cost for facility i in \$	$i \in I$
r_i	required land for facility i in ft^2	$i \in I$

Variables

$$x_{ij} \quad \begin{cases} 1 & \text{facility } i \text{ is built on site } j \\ 0 & \text{if else} \end{cases} \qquad i \in I, j \in J$$

Objectives

$$\min \quad \sum_{i \in I} \sum_{j \in J} x_{ij} c_i \qquad \text{(construction cost)} \tag{1}$$

$$\min \quad \sum_{i \in I} \sum_{j \in J} x_{ij} a_j - x_{ij} r_i \qquad \text{(unused land cost)} \tag{2}$$

$$\max \quad \sum_{i \in I} \sum_{j \in J} x_{ij} u_{ij} \qquad \text{(user days)} \tag{3}$$

Constraints

$$\sum_{j:(i,j)\in A} x_{ij}^k - \sum_{j:(j,i)\in A} x_{ji}^k = b_i^k \qquad \forall k \in K, i \in N \tag{4}$$

$$\sum_{k\in K} x_{ij}^k \leq u_{ij} \qquad \forall (i,j) \in A \tag{5}$$

$$0 \leq x_{ij}^k \leq u_{ij}^k \qquad \forall k \in K, (i,j) \in A \tag{6}$$