

**END3991 OPERATIONS RESEARCH 2 HOMEWORK**

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# QUESTION 1

## Mathematical Model of Question1

|  |  |
| --- | --- |
| **Sets** |  |
|  | Set of Warehouses {*A,B,C,D*} |
|  | Set of Fruits {*Lemon,Tangerine,Orange,Apple,Banana*} |
|  | Set of Markets {*M1,M2,M3,M4,M5,M6,M7,M8,M9,M10*} |

|  |  |
| --- | --- |
| **Parameter** |  |
|  | Distance between warehouse to market |
|  | Demand of market of fruit |
|  | Number of pieces of each fruit will fit in a case (**Capacity**) |

|  |  |
| --- | --- |
| **Variables** |  |
|  | Distance between warehouse to market |
|  | **1**, if the fruit is transported from warehouse to market  **0** otherwise |

### Objective Function

### Constraints

**Service Constraints** (Each market can receive service from only one warehouse.)

**Demand Constraints**

**Capacity Constraints** (All warehouses can hold a total of 30 cases of fruits.)

**Specific Warehouse Constraints**

(Lemons, tangerines and oranges cannot be found in warehouse D. Bananas cannot be found in warehouse A)

**Linking Constraints:**

**Non-Negativity:**

# QUESTION 2

## Section **a**

|  |  |
| --- | --- |
| **Sets** |  |
|  | indexes of rows {1,2,...,9} |
|  | indexes of columns {1,2,...,9} |
|  | numbers {1,2,...,9} |

|  |  |
| --- | --- |
| **Variables** |  |
|  | Binary variables representing the presence of **number (k)** in the **i**-th row and **j**-th column. |

### Mathematical Model (The objective function is not required for this option.)

**st.**

## Section **b**

|  |  |
| --- | --- |
| **Sets** |  |
|  | indexes of rows {1,2,...,9} |
|  | indexes of columns {1,2,...,9} |
|  | numbers {1,2,...,9} |

|  |  |
| --- | --- |
| **Variables** |  |
|  | Binary variables representing the presence of **number (k)** in the **i**-th row and **j**-th column. |

### Mathematical Model

***St.***

## Section **c**

|  |  |
| --- | --- |
| **Sets** |  |
|  | indexes of rows {1,2,...,9} |
|  | indexes of columns {1,2,...,9} |
|  | numbers {1,2,...,9} |

|  |  |
| --- | --- |
| **Variables** |  |
|  | Binary variables representing the presence of **number (k)** in the **i**-th row and **j**-th column. |

### Mathematical Model

***St.***