Walmart currently ships products from 5 Warehouses to 4 Stores in New York. It is considering closing one or more warehouse to reduce cost. This would increase distribution cost but perhaps lower overall cost. What plants, if any, should the company close?

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| --- | --- | --- | --- | --- | --- | --- | --- |
| ***Transportation Costs (per 1000 products)*** | | | |  |  |  |  |
|  | **Warehouse 1** | **Warehouse 2** | **Warehouse 3** | **Warehouse 4** | **Warehouse 5** |  |  |
| **Store 1** | $4,000 | $2,000 | $3,000 | $2,500 | $4,500 |  |  |
| **Store 2** | $2,500 | $2,600 | $3,400 | $3,000 | $4,000 |  |  |
| **Store 3** | $1,200 | $1,800 | $2,600 | $4,100 | $3,000 |  |  |
| **Store 4** | $2,200 | $2,600 | $3,100 | $3,700 | $3,200 |  |  |

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|  |
| ***Open/close decision variables*** | | |  |  |  |  |  |
|  | **Warehouse 1** | **Warehouse 2** | **Warehouse 3** | **Warehouse 4** | **Warehouse 5** |  |  |
| **Decision** | 0 | 0 | 0 | 0 | 0 |  |  |

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|  |
| ***Number of products to ship (per 1000)*** | | | |  |  |  |  |
|  | **Warehouse 1** | **Warehouse 2** | **Warehouse 3** | **Warehouse 4** | **Warehouse 5** | **Total** | **Demand** |
| **Store 1** | 0 | 0 | 0 | 0 | 0 | 0 | 15 |
| **Store 2** | 0 | 0 | 0 | 0 | 0 | 0 | 18 |
| **Store 3** | 0 | 0 | 0 | 0 | 0 | 0 | 14 |
| **Store 4** | 0 | 0 | 0 | 0 | 0 | 0 | 20 |
| **Total** | 0 | 0 | 0 | 0 | 0 |  |  |
| **Capacity** | 0 | 0 | 0 | 0 | 0 |  |  |
| **Distr. Cost** | $0 | $0 | $0 | $0 | $0 |  |  |
| **Fixed Cost** | $0 | $0 | $0 | $0 | $0 |  |  |
| **Total Cost** | $0 | $0 | $0 | $0 | $0 | $0 |  |

**Solution**

1) The variables are the decisions to open or close the plants, and the number of products that should be

shipped from the plants that are open to the warehouses. In worksheet Facility these are given the names

Open\_or\_close and Products\_shipped.

2) The logical constraints are

Products\_shipped >= 0 via the Assume Non-Negative option

Open\_or\_close = binary

The products made can not exceed the capacity of the plants and the number shipped should meet the

demand. This gives

Products\_made <= Capacity

Total\_shipped >= Demand

3) The objective is to minimize cost. This is given the name Total\_cost on the worksheet.