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**CS 177 Project (Question 11)**

1. Question 11 provides with a table that shows the costs of transporting a product from 2 factories to any depots and then to any customers. (See Below)

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | Benicia fac | LB fac | SF depot | Sac depot | LA depot | SD depot |  | demand |
| SF depot | 1 | 8 |  |  |  |  |  |  |
| Sac depot | 2 | 6 |  |  |  |  |  |  |
| LA depot | 7 | 1 |  |  |  |  |  |  |
| SD depot | 9 | 2 |  |  |  |  |  |  |
| C1 | 2 | 7 | 2 | 3 | 6 | 9 |  | 50000 |
| C2 | 7 | 2 | 8 | 12 | 8 | 9 |  | 10000 |
| C3 | 8 | 4 | 11 | 5 | 11 | 7 |  | 40000 |
| C4 | 11 | 5 | 12 | 10 | 4 | 6 |  | 35000 |
| C5 | 4 | 4 | 4 | 3 | 3 | 6 |  | 60000 |
| C6 | 5 | 3 | 5 | 4 | 2 | 4 |  | 20000 |
|  |  |  |  |  |  |  |  |  |
| capacity | 150000 | 200000 | 70000 | 50000 | 100000 | 40000 |  |  |

From the factory, the product can go directly to the customer or, through a depot and then to the customer. For this project I represented the paths that went through a depot and then to a customer as one path with cost: costFromFactoryToDepot + costFromDepotToCustomer.

1. **The Problem**

**Let**  be the number of units shipped from factory ‘i’ to customer ‘j’.

**Let**  be the number of units shipped from factory ‘i’ to depot ‘k’ to customer ‘j’.

1 i 2 , 1 k 4 , 1 j 6

**Min:**

2 + 7 + 8 + 11 + 4 + 5 + 3 + 9 + 12 + 13 + 5 + 6 + 5 + 14 + 7 + 12 + 5 + 6 + 13 + 15 + 18 + 11 + 10 + 9 + 18 + 18 + 16 + 15 + 15 + 13 + 7 + 2 + 4 + 5 + 4 + 3 + 10 + 16 + 19 + 20 + 12 + 13 + 9 + 18 + 11 + 16 + 9 + 10 + 7 + 9 + 12 + 5 + 4 + 3 + 11 + 11 + 9 + 8 + 8 + 6

**Subject to:**

**Factory production constraints**

+ + + + + + + + + + + + + + + + + + + + + + + + + + + + +

+ + + + + + + + + + + + + + + + + + + + + + + + + + + + +

**Warehouse capacity constraints**

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+ + + + + + + + + + +

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+ + + + + + + + + + +

**Customer demand constraints**

+ + + + + + +

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+ + + + + + +

+ + + + + + +

+ + + + + + +

+ + + + + + +