

- Wheat is harvested in the Midwest and stored in grain elevators in three different cities—Kansas City, Omaha, and Des Moines. These grain elevators supply three flour mills, located in Chicago, St. Louis, and Cincinnati. Grain is shipped to the mills in railroad cars, each car capable of holding one ton of wheat. Each grain elevator is able to supply the following number of tons (i.e., railroad cars) of wheat to the mills on a monthly basis.

<i>Grain Elevator</i>	<i>Supply</i>
Kansas City	150
Omaha	175
Des Moines	<u>275</u>
Total	600 tons

Each mill demands the following number of tons of wheat per month.

<i>Mill</i>	<i>Demand</i>
Chicago	200
St. Louis	100
Cincinnati	<u>300</u>
Total	600 tons

The cost of transporting one ton of wheat from each grain elevator (source) to each mill (destination) differs according to the distance and rail system. These costs are shown in the following table. For example, the cost of shipping one ton of wheat from the grain elevator at Omaha to the mill at Chicago is \$7.

<i>Grain Elevator</i>	<i>Mill</i>		
	<i>A. Chicago</i>	<i>B. St. Louis</i>	<i>C. Cincinnati</i>
1. Kansas City	\$6	\$8	\$10
2. Omaha	7	11	11
3. Des Moines	4	5	12

The problem is to determine how many tons of wheat to transport from each grain elevator to each mill on a monthly basis in order to minimize the total cost of transportation.

- A Company has 3 production facilities S₁, S₂ and S₃ with production capacity of 7, 9 and 18 units (in 100's) per week of a product, respectively. These units are to be shipped to 4 warehouses D₁, D₂, D₃ and D₄ with requirement of 5, 6, 7 and 14 units (in 100's) per week, respectively. The transportation costs (in rupees) per unit between factories to warehouses are given in the table below.

	D ₁	D ₂	D ₃	D ₄	Capacity
S ₁	19	30	50	10	7
S ₂	70	30	40	60	9
S ₃	40	8	70	20	18
Demand	5	8	7	14	34

Find initial basic feasible solution for given problem by using

- (a) North-West corner method
 - (b) Least cost method
 - (c) Vogel's approximation method
 - (d) obtain an optimal solution by MODI method
- if the object is to minimize the total transportation cost.