# SELF TRY EXAMPLES FOR QUANTITATIVE ANALYSIS – PART 2

## TRANSPORTATION PROBLEMS

Example 1

Find the best transportation solution (using VAM and U-V method) for the firm with three distribution centres – A, B, and C, and three plants – X, Y, Z. The supply of plants and demand at distribution centres are as below:  
Supply from X, Y, Z are 100, 300, and 300 respectively.   
Demand at A, B, C are 300, 200, 200 respectively.   
Cost matrix from each plant to each distribution centre are as below:

|  |  |  |  |
| --- | --- | --- | --- |
| **DC⏵ Plants⏷** | **A** | **B** | **C** |
| **X** | 5 | 4 | 3 |
| **Y** | 8 | 4 | 3 |
| **Z** | 9 | 7 | 5 |

Example 2

Five warehouses are supplied by four factories. The supply available from each factory, the demand at each warehouse and the cost per unit of transporting goods from the factories to the warehouses are summarized in the following table:

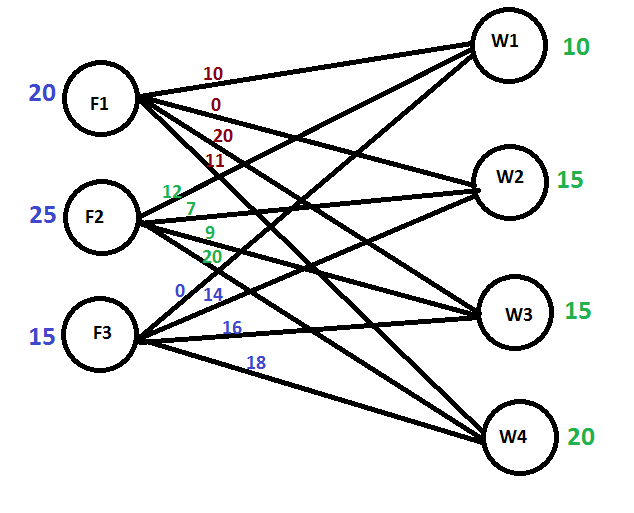
|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | W1 | W2 | W3 | W4 | W5 | Supply |
|  |
| F1 | 13 | 9 | 15 | 10 | 12 | 40 |
| F2 | 11 | 10 | 12 | 12 | 9 | 10 |
| F3 | 12 | 9 | 11 | 12 | 9 | 20 |
| F4 | 13 | 12 | 13 | 12 | 10 | 10 |
| Demand | 12 | 15 | 20 | 15 | 18 |  |

a. Compute initial feasible solution for the above problem.

b. Find the optimum feasible solution and calculate the least possible transportation cost.

Example 3:

A company that has 4 warehouses and 3 factories is trying to minimize the transportation cost between the factories and warehouses. The cost pattern, demand, and supply details are as below:

You are required to identify the best transportation routes to minimize total transportation cost of the organization.

**Example 4**

Three refineries with maximum daily capacities of 6, 5, and 8 million gallons of oil supply three distribution areas with daily demands of 4, 8 and 7 million gallons. Oil is transported to the three distribution areas through a network of pipes. The transportation cost is 1 birr per 100 gallons per mile. The mileage table below shows that refinery 1 is not connected to distribution area 3. Formulate the problem as a transportation model and solve it. [Hint: Let the transportation cost for the non-connected route be equal to some large value M say and then proceed as normal.]



**Example 5**

Five warehouses are supplied by four factories. The supply available from each factory, the demand at each warehouse and the cost per unit of transporting goods from the factories to the warehouses are summarized in the following table:



Find the optimal solution of this problem, i.e. the solution that minimizes the transportation costs, clearly showing and explaining your working.

## ASSIGNMENT PROBLEMS

*Example 1*

A construction company has four large bulldozers located at four different garages. The bulldozers are to be moved to four different construction sites. The distances in miles between the bulldozers and the construction sites are given below.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Sites 🡪 Bdozer↓** | **A** | **B** | **C** | **D** |
| **1** | 90 | 75 | 75 | 80 |
| **2** | 35 | 85 | 55 | 65 |
| **3** | 125 | 95 | 90 | 105 |
| **4** | 45 | 110 | 95 | 115 |

How should the bulldozers be moved to the construction sites in order to minimize the total distance travelled?

*Example 2*

You work as a sales manager for a toy manufacturing company, and you currently have three salespeople on the road meeting buyers. Your salespeople are in Addis Ababa, Axum and Gondar. You want them to fly to three other cities: Hawasa, Kambolcha, and Bahir Dar. The table below shows the cost of airplane tickets in dollars between these cities.

|  |  |  |  |
| --- | --- | --- | --- |
| **From/To** | **Hawasa** | **Kombolcha** | **Bahir Dar** |
| **Addis** | 250 | 400 | 350 |
| **Axum** | 400 | 600 | 350 |
| **Gondar** | 200 | 400 | 250 |

Where should you send each of your salespeople to minimise the airfare?

Example 3

At the head office of Techno Support, a technical solution provider for computer users, there are five service counters. There are five service executives available for the organization and their average income generation at each counter is shown below.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Counter** | **Service Executives** | | | | |
| **A** | **B** | **C** | **D** | **E** |
| **1** | 30 | 37 | 40 | 28 | 40 |
| **2** | 40 | 24 | 27 | 21 | 36 |
| **3** | 40 | 32 | 33 | 30 | 35 |
| **4** | 25 | 38 | 40 | 36 | 36 |
| **5** | 29 | 62 | 41 | 34 | 39 |

How should the counters be assigned to persons so as to maximize the profit?

Example 4

The personnel director of ABC Ltd must assign four recently selected graduates to four regional offices. The graduates are all well qualified so the decision will be based on the costs of relocating the graduates and their families. The cost data are presented in the following table (in 1000 Birr)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Offices** | **Graduates** | | | |
| **Albert** | **Getnet** | **Haywot** | **Tesfaye** |
| **Addis Ababa** | 30 | 22 | 24 | 25 |
| **Hawasa** | 26 | 22 | 36 | 23 |
| **Bahir Dar** | 43 | 21 | 23 | 39 |
| **Axum** | 40 | 22 | 23 | 39 |

1. What are the possible assignments available for this case in order to minimize the total allocation cost?
2. What is the minimum cost of assignments?

Example 5

