**Assignment of OR for 3rd year extension management students**

1. A manufacturing company is engaged in producing three types of products: A, B, and C. The production department produces each day components sufficient to make 50 units of A, 25 units of B, and 30 units of C. The management is confronted with the problem of optimizing the daily production of products in assembly department where only 100 man hrs are available daily to assemble the products. The following additional information is available.

Type of product Profit contribution per unit (Birr) Assembly time per product (hrs)

A 12 0.8

B 20 1.7

C 45 2.5

The company has a daily order commitment for 20 units of product A, and a total of 15 units of product B and C.

Required:

1. Formulate the problem as LPM so as to maximize the total profit?
2. Solve the problem using the algebraic method
3. Oranges are grown, picked, and then stored in warehouses in Tampa, Miami, and Fresno. These warehouses supply oranges to markets in New York, Philadelphia, Chicago, and Boston. The following table shows the shipping costs per truckload ($100s), supply, and demand.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  |  |  | **To** |  |  |  |
| From | New York | | Philadelphia | Chicago | Boston | Supply |
| Tampa |  | 9 | 14 | 12 | 17 | 200 |
| Miami |  | 11 | 10 | 6 | 10 | 200 |
| Fresno |  | 12 | 8 | 15 | 7 | 200 |
| Demand | 130 | | 170 | 100 | 200 |  |

Required

1. Set up the transportation tableau for this problem and determine the initial solution using the minimum cell cost method.
2. Formulate this problem as a linear programming model.
3. A university department head has five instructors to be assigned to four different courses. All of the instructors have taught the courses in the past and have been evaluated by the students. The rating for each in­structor for each course is given in the following table (a perfect score is 100).

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  |  | **Course** | |  |
| **Instructor** | A | B | C | D |
| 1 | 80 | 75 | 90 | 85 |
| 2 | 95 | 90 | 90 | 97 |
| 3 | 85 | 95 | 88 | 91 |
| 4 | 93 | 91 | 80 | 84 |
| 5 | 91 | 92 | 93 | 88 |

The department head wants to know the optimal assignment of instruc­tors to courses that will maximize the overall average evaluation.

Required: Solve this problem using the assignment method.

1. Solve the following problem graphically

Maximize 4x1 + 4x2

Subject to: -2x1 + x2 ≤ 1

x1 ≤ 2

x1 + x2 ≤ 3

x1, x2 ≥ 0

5. A company has three factories located in three cities viz. X, Y, Z. These factories supplies consignments to four dealers viz. A, B, C and D. The dealers are spread all over the country. The production capacity of these factories is 1000, 700 and 900 units per month respectively. The net return per unit product is given in the following table.

Solve this maximization case of transportation.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **FACTORIES** | **DEALERS** | | | | CAPACITY |
| **A** | **B** | **C** | **D** |
| X | 6 | 6 | 6 | 4 | 1000 |
| Y | 4 | 2 | 4 | 5 | 700 |
| Z | 5 | 6 | 7 | 8 | 900 |
| **REQUIREMENT** | **900** | **800** | **500** | **400** |  |