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

1. A transistor radio Co., manufactures models A, B, and C which have profit contribution of Birr 16, Birr 30 and Birr 50 respectively. The weekly minimum production requirements are 20 for model A, 120 for model B, and 60 for model C. Each type of radio requires a certain amount of time for the manufacturing of component parts, assembly and packaging. Specifically a dozen unit of model A requires 3 hrs for manufacturing of component parts, 4b hrs for assembly and 1 hr for packaging. The corresponding figure for a dozen unit of model B is 3.5, 5 and 1.5 and for a dozen unit of C are 5, 8, and 3 hrs. During the forth coming week, the company has availability of 120 hrs of manufacturing, 160 hrs of assembly, and 45 hrs of packaging time.

**Required:**

a) Formulate the scheduling problem as LPM.

b) Solve the problem using simplex method

c) Identify basic and non basic variables at each iteration

2. A transportation problem involves the following costs, supply, and demand.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  |  | **To** | |  |  |
| **From** | 1 | 2 | 3 | 4 | **Supply** |
| 1 | $500 | 750 | 300 | 450 | 12 |
| 2 | 650 | 800 | 400 | 600 | 17 |
| 3 | 400 | 700 | 500 | 550 | 11 |
| **Demand** | 10 | 10 | 10 | 10 |  |

**REQUIRED**

Find the initial solution using

1. the northwest corner method,
2. the minimum cell cost method, and
3. Vogel's Approximation Method. Compute total cost for each.
4. Evaluate the occupied cells by using stepping stone technique based on northwest corner method
5. An electronics firm produces electronic components, which it supplies to various electrical manufacturers. Quality control records indicate that different employees produce different numbers of defective items. The average number of defects produced by each employee for each of six components is given in the following table.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  |  |  | **Component** | |  |  |
| **Employee** | A | B | C | D | E | F |
| 1 | 30 | 24 | 16 | 26 | 30 | 2222 |
| 2 | 22 | 28 | 14 | 30 | 20 | 13 |
| 3 | 18 | 16 | 25 | 14 | 12 | 22 |
| 4 | 14 | 22 | 18 | 23 | 21 | 30 |
| 5 | 25 | 18 | 14 | 16 | 16 | 28 |
| 6 | 32 | 14 | 10 | 14 | 18 | 200 |

Required: Determine the **optimal assignment** that will minimize the total average number of defects per month.

1. The owner of the Burger Doodle Restaurant is considering two ways to expand operations: opening a drive-up window or serving breakfast. The increase in profits resulting from these proposed expansions de­pends on whether a competitor opens a franchise down the street. The possible Profits from each expansion in operations given both future competitive situations are shown in the following payoff table.

Competitor

Decision open Not Open

Drive-up window $-6,000 $20,000

Breakfast 4,000 8,000

Select the best decision using the following decision criteria.

a) Maximax

1. Maximin
2. Equally likely
3. Minimax regret

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** |  |