

Solve the Following Problems

Problem # 1 (20 Points)

Solve the following linear program and identify any alternative optimal solutions.

$$\begin{aligned} \text{Max } & 120x_1 + 80x_2 + 14x_3 \\ \text{s.t. } & \\ & 4x_1 + 8x_2 + x_3 \leq 200 \\ & 2x_2 + 1x_3 \leq 300 \\ & 32x_1 + 4x_2 + 2x_3 = 400 \\ & x_1, x_2, x_3 \geq 0 \end{aligned}$$

Problem # 3 (20 Points)

Sun Corporation has a one-year contract to supply motors for all refrigerators produced by the IA Corporation. IA manufactures the refrigerators at four locations around the country: Boston, Dallas, Los Angeles, and St. Paul. Plans call for the following number (in thousands) of refrigerators to be produced at each location:

Boston	50
Dallas	70
Los Angeles	60
St. Paul	80

Sun's three plants are capable of producing the motors. The plants and production capacities (in thousands) are

Denver	100
Atlanta	100
Chicago	180

Because of varying production and transportation costs, the profit that Sun earns on each lot of 1000 units depends on which plant produced the lot and which destination it was shipped to. The following table gives the accounting department estimates of the profit per unit (shipments will be made in lots of 1000 units):

Produced At	Shipped To			
	Boston	Dallas	Los Angeles	St. Paul
Denver	7	11	8	13
Atlanta	20	17	12	10
Chicago	8	18	13	16

With profit maximization as a criterion, Sun's management wants to determine how many motors should be produced at each plant and how many motors should be shipped from each plant to each destination.

- Develop a network representation of this problem.
- Find the optimal solution.