## Part D

Write out a generalized linear programming model. Give the objective function and constraints as mathematical formula.

For a given Plant-Warehouse-Retailer distribution model with plants, warehouses, and retailers:

Let be the subscript index for plants

Let be the subscript index for Warehouses

Let be the subscript index for Retailers

Let be the units to ship from to

Let be the units to ship from to

Let be the supply available at

Let be the demand at each.

Let be the cost of shipping from to .

Let be the cost of shipping from to   
  
Objective:   
Minimize the cost function, f:

Constraints:

//The sum of shipments from plant p can be no more than the supply available at plant p (). Note, where there are 0 shipments from plant p to warehouse w, evaluates to 0.  
  
For a given plant p, where 1 ≤ p ≤ n, this is given by the inequality:

//The sum of shipments to retailer r must be exactly equal to the demand at Retailer r. Note, where there are 0 shipments from warehouse w to retailer r, evaluates to 0.  
  
For a given retailer r, where 1 ≤ r ≤ q, this is given by the equality:

//The number of units shipped from each warehouse w must be less than or equal to the amount of units shipped to the warehouse. That is, for each warehouse, the sum of outgoing shipments, , minus the sum of incoming shipments, , must be non-positive.

For a given warehouse w, where 1 ≤ w ≤ m, this is given by the inequality:

//The amount shipped from any plant to any warehouse must be non-negative.

for all values 1 ≤ p ≤ n, and 1 ≤ w ≤ m  
  
//The amount shipped from any warehouse to any retailer must also be non-negative.

for all values 1 ≤ w ≤ m, and 1 ≤ r ≤ q.