Goal Programming

Avinash Ravipudi

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EMAX Corporation:

Maximize Z = P - 6C - 3D, where

P = total (discounted) profit over the life of the new products,   
 C = change (in either direction) in the current level of employment,   
 D = decrease (if any) in next year’s earnings from the current year’s level.

From the Given table i can write an equation as follows

P = 20X1 + 15X2 + 25X3  
 Y1 = 6X1 + 4X2 + 5X3 - 50  
 Y2 = 8X1 + 7X2 +5X3 - 75  
  
 Y1+ is going over the employment level goal and the weighted penality is 6  
 Y1- is going under the employment level goal and the weighted penality is 6  
 Y2+ is going over the earnings goal for next year- no penality  
 Y2- is going under the earnings goal for next year and the peanlity is 3.  
 X1 is the quantity of product 1 to be produced  
 X2 is the quantity of product 2 to be produced  
 X3 is the quantity of product 3 to be produced

LP formulation: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ // Objective function MAX: 20X1 + 15X2 + 25X3 - 6 Y1P - 6 Y1M - 3 Y2M;

// Constraints 6X1 + 4X2 + 5X3 + Y1P - Y1M = 50; 8X1 + 7X2 + 5X3 + Y2P - Y2M = 75;

library(lpSolveAPI)  
Zmax <- read.lp("Zmax.lp")  
Zmax

## Model name:   
## x1 x2 x3 y1p y1m y2m y2p   
## Maximize 20 15 25 -6 -6 -3 0   
## R1 6 4 5 -1 1 0 0 = 50  
## R2 8 7 5 0 0 1 -1 = 75  
## Kind Std Std Std Std Std Std Std   
## Type Real Real Real Real Real Real Real   
## Upper Inf Inf Inf Inf Inf Inf Inf   
## Lower 0 0 0 0 0 0 0

solve (Zmax)

## [1] 0

get.objective(Zmax)

## [1] 225

#To make 225 million dollars, Emax must create 15 units of product 3 and none of products 1 and 2. Employment will exceed the target by 2500 people.  
get.variables(Zmax)

## [1] 0 0 15 25 0 0 0