

Assumptions of Linear Programming

Now that you have seen how some simple problems can be formulated and solved as linear programs, it is useful to reconsider the question of when a problem can be realistically represented as a linear programming problem. A problem can be realistically represented as a linear program if the following assumptions hold:

The constraints and objective function are linear.

This requires that the value of the objective function and the response of each resource expressed by the constraints is proportional to the level of each activity expressed in the variables.

Linearity also requires that the effects of the value of each variable on the values of the objective function and the constraints are additive. In other words, there can be no interactions between the effects of different activities; i.e., the level of activity P_1 should not affect the costs or benefits associated with the level of activity P_2 .

Divisibility -- the values of decision variables can be fractions. Sometimes these values only make sense if they are integers; then we need an extension of linear programming called integer

programming.

Certainty -- the model assumes that the responses to the values of the variables are exactly equal to the responses represented by the coefficients.

Data -- formulating a linear program to solve a problem assumes that data are available to specify the problem.