



Optimization

www.gams.com

Support

Sales

Solvers

Documentation

Model Library

gamsworld.org

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High-Level Modeling

The General Algebraic Modeling System (GAMS) is a **high-level modeling system** for mathematical programming problems. GAMS is tailored for complex, large-scale modeling applications, and allows you to build large maintainable models that can be adapted quickly to new situations. Models are **fully portable** from one computer platform to another.

Wide Range of Model Types

GAMS allows the formulation of models in many different problem classes, including

- Linear (LP) and Mixed Integer Linear (MIP)
- Quadratic Programming (QCP) and Mixed Integer QCP (MIQCP)
- Nonlinear (NLP) and Mixed Integer NLP (MINLP)
- Constrained Nonlinear Systems (CNS)
- Mixed Complementarity (MCP)
- Programs with Equilibrium Constraints (MPEC)
- Conic Programming Problems
- Stochastic Linear Problems

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Sets
  i /newyork, seattle, san-diego, topeka/
  j /chicago, boston, montreal/
  k /cases/
  l /plants, warehouses, distribution centers/
  m /1..3/
  n /1..2/
  o /1..3/
  p /1..4/
  q /1..5/
  r /1..6/
  s /1..7/
  t /1..8/
  u /1..9/
  v /1..10/
  w /1..11/
  x /1..12/
  y /1..13/
  z /1..14/;

Parameters
  b(j) demand at market j in cases
    newyork 325
    seattle 250
    san-diego 275
    topeka 275 /;
  d(i,j) distance in thousands of miles
    seattle newyork 1.7
    seattle montreal 1.8
    seattle topeka 1.8
    san-diego newyork 2.5
    san-diego montreal 2.5
    san-diego topeka 1.8;
  f freight in dollars per case per thousand miles /0/;
  c(i,j) transportation cost in thousands of dollars per case;
  c(i,j) = f * d(i,j) / 1000;

Variables
  x(i,j) shipment quantities in cases
  z total transportation costs in thousands of dollars;

Positive Variable x;

Equations
  obj define objective function
  supply(i) observe supply limit at plant i
  demand(j) observe demand at market j;
  cost(i,j) sum(c(i,j)*x(i,j));
  supply(i).. sum(j, x(i,j)) =l= a(i);
  demand(j).. sum(i, x(i,j)) =g= b(j);

Model transport /ALL/;
Solve transport using lp minimizing z;

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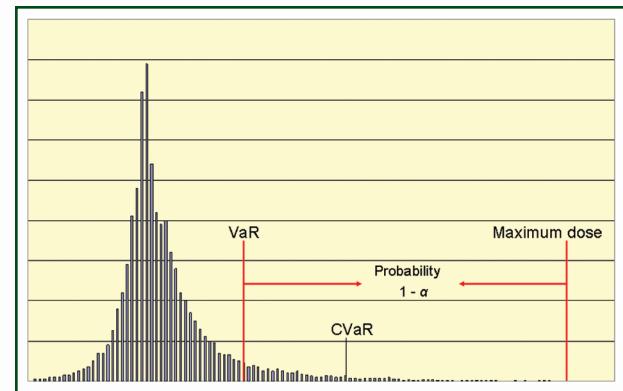
GAMS Integrated Developer Environment for editing, debugging and solving models and viewing data.

State-of-the-Art Solvers

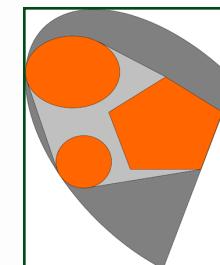
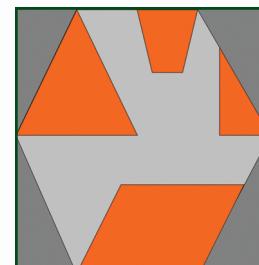
GAMS incorporates all major commercial and academic **state-of-the-art solution technologies** for a broad range of problem types, including global nonlinear optimization solvers.

Framework for Novel Mathematical Programming Reformulations

GAMS supports representation of a wide collection of established mathematical programming problems. New trends in research lead to models that have outgrown the traditional algebraic representation. GAMS provides new facilities for seamless integration of these new model types by means of an automatic reformulation framework.



CVaR Constraints: Mean Excess Dose (Radiotherapy)



Convex Hull and Big-M Relaxation