



Exercise

Classifying Mathematical Optimization Problems

Use the table below to match the four mathematical optimization problems **a** through **d** with decision variables x , y , and z to the four problem classes: LP (linear programming), ILP (integer linear programming), MILP (mixed-integer linear programming), and NLP (nonlinear programming).

Linear Programming (LP)	all continuous variables all linear functions
Integer Linear Programming (ILP)	all integer variables all linear functions
Mixed-Integer Linear Programming (MILP)	some integer variables all linear functions
Nonlinear Programming (NLP)	all continuous variables some nonlinear functions

- a.** minimize $4x + 5y + 2z$
subject to $7x + 8y + 3z \geq 20$
 $x \geq 0, y \geq 0, z \geq 0$
 x, y, z integers
- b.** maximize $3x + 5y - 4z$
subject to $6x^2 + 2y^2 + z^2 \leq 17$
 $x + y + z = 3$
 $-1 \leq x \leq 1$
- c.** maximize $12x + 19y - 4z$
subject to $x + 3y + z = 225$
 $x + y - z \leq 117$
 $x \geq 0, y \geq 0, z \geq 0$
- d.** maximize $4x + 5y$
subject to $x + y + 2z \leq 10$
 $2x + 3y - 3z \leq 5$
 $x \geq 0, y \geq 0$
 x, y integers