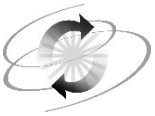

Exercise

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