

### Polyhedral sets in standard form

In the context of linear programming problems, we will often consider problems written in the so-called standard form. The standard form can be understood as posing the linear programming problem as an underdetermined system of equations (that is, with fewer equations than variables). Then, we will work on selecting a subset of the variables to be set to zero so that the number of remaining variables is the same as that of equations, making the system solvable.

A key point in this chapter will be devising how we relate this process of selecting variables with that of selecting a subset of active constraints (forming a vertex, as we have seen in the previous chapter) that will eventually lead to an optimal solution.

The standard form of linear programming problems

First, let us formally define the notion of a standard-form polyhedral set. Let  $A$  be a  $m \times n$  matrix and  $b \in \mathbb{R}^m$ . The standard form polyhedral set  $P$  is given by equation\*  $P = \{x \in \mathbb{R}^n : Ax = b, x \geq 0\}$ .