

*the best answer to a straight-line problem always sits at a corner*

## The pieces of an LPP

decision variables

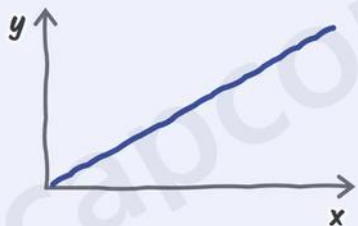
$$x, y \geq 0$$

objective function to optimise

$$Z = ax + by$$

constraints, one linear inequality per restriction

$$a_1x + b_1y \leq c_1$$



a linear constraint like  $ax + by$  is less than or equal to  $c$  plots as a straight boundary line, every point satisfying the inequality lies on one side of it

non-negativity,  $x \geq 0$  and  $y \geq 0$ , is part of the constraint set too, it isn't optional just because it's written once at the end

## Formulating an LPP from words \*

- identify what's being decided, and name those quantities  $x$  and  $y$
- write the goal as a linear expression  $Z = ax + by$ , stating clearly whether it's a maximum or a minimum being sought
- turn every restriction, 'at most', 'at least', 'no more than', into one linear inequality
- add  $x \geq 0, y \geq 0$  unless negative values are actually meaningful for the problem

every constraint is a straight **LINE** once the inequality sign is replaced with an equals sign. The inequality only decides which **SIDE** of that line counts

## Two ideas the graphical method leans on



a corner point of the feasible region is exactly where two boundary lines meet, and the corner point theorem says the optimum always sits at one of these



one member of the objective line's family,  $ax + by = k$ : a different  $k$  slides it to a parallel copy, and no two members ever cross