

## MULTIOBJECTIVE OPTIMIZATION PROBLEMS

## Why

Often we care about multiple criteria at once.<sup>1</sup>

## Definition

A multiobjective optimization problem is a pair  $(X, f: X \to \mathbf{R}^d)$ . As before, X is the constraint set and f is called the objective function. Since f is vector valued, and there is no natural order on  $\mathbf{R}^d$ , there may exist  $x \in X$  with non-comparable images under f.

## Scalarization

The  $\alpha \in \mathbf{R}^d$  scalarization of a multiobjective optimization problem (X, f) is the optimization problem (X, g) where  $g: X \to \mathbf{R}$  is defined by  $g(x) = \alpha^{\top} f(x)$ . We call g the scalarized objective.

<sup>&</sup>lt;sup>1</sup>Future editions will modify.

