basic_unconstrained

A trivial example with no constraints and no dependencies between the upper and lower-level programs is used to diagnose solvers. It's unique global optimum is found at $x = [1, -2, 3, -4]$ and $y = [1, -2, 3, -4]$.

$$\begin{aligned} \underset{x,y}{\text{minimise}} \quad & (x_1 - 1)^2 + (x_2 + 2)^2 + (x_3 - 3)^2 + (x_4 + 4)^2 \\ \text{subject to} \quad & y \in \arg\min_{y} \left((y_1 - 1)^2 + (y_2 + 2)^2 + (y_3 - 3)^2 + (y_4 + 4)^2\right) \end{aligned}$$

			Dimension	Type
Upper-level	x	variables	4	real
	F(x,y)	objective	1	quadratic
	G(x,y)	inequality	0	none
	H(x,y)	equality	0	none
Lower-level	y	variables	4	real
	f(x,y)	objective	1	quadratic
	g(x,y)	inequality	0	none
	h(x,y)	equality	0	none