BLENDING PROBLEM

VAR

x_i amount of crude i to buy, $i = 1, 2, 3$

y_j amount of gas j to sell, $j = 1, 2$

z_{ij} amount of crude i in gas j

MODEL:

$$\max \quad 120\,y_1 + 140\,y_2 - 60\,x_1 - 85\,x_2 - 120\,x_3$$

s.t.

$$0 \le x_1, x_2, x_3 \le 5000$$

$$y_1 \ge 8000$$

$$y_2 \ge 4000$$

$$y_1 = z_{11} + z_{21} + z_{31}$$

$$y_2 = z_{12} + z_{22} + z_{32}$$

$$x_1 = z_{11} + z_{12}$$

$$x_2 = z_{21} + z_{22}$$

$$x_3 = z_{31} + z_{32}$$

$$z_{ij} \ge 0 \qquad \text{for all } i = 1, 2, 3,\ j = 1, 2$$

$$80 z_{11} + 90 z_{21} + 98 z_{31} \geq 87 g_1$$

$$80 z_{12} + 90 z_{22} + 98 z_{32} \geq 91 g_2$$

$$20 z_{11} + 10 z_{21} + 5 z_{31} \leq 15 g_1$$

$$20 z_{12} + 10 z_{22} + 5 z_{32} \leq 9 g_2$$

MULTIPERIOD

VAR: $x_A, \ldots, x_E$: investment in project $A, \ldots, E$

$y_1, \ldots, y_4$: bank account level at beginning of year $1, \ldots, 4$

MODEL

$$\max \quad y_4$$

$$\text{s.t.} \quad y_1 = 100\,000 - x_A - x_C - x_D$$

$$y_2 = 1.08\, y_1 + 0.5 x_A + 1.2 x_C - x_B$$

$$y_3 = 1.08\, y_2 + 1 x_A + 0.5 x_B - x_E$$

$$y_4 = 1.08\, y_3 + x_B + 1.9 x_D + 1.5 x_E$$

$$0 \leq x_A, \ldots, x_E \leq 75\,000$$

$$y_1, \ldots, y_4 \geq 0$$

MULTIPERIOD (GENERIC)

VAR: x_i : investment in project $i = 1, \ldots, M$

y_j : bank account level at beginning of year $j = 1, \ldots, N$

MODEL:

$$\max \quad y_N$$

$$\text{s.t.} \quad y_1 = K + \sum_{i=1}^{M} f_{i1} x_i$$

$$y_j = (1+R) y_{j-1} + \sum_{i=1}^{M} f_{ij} x_i, \qquad \text{for all } j = 2, \ldots, N$$

$$0 \leq x_i \leq U \qquad \text{for all } i = 1, \ldots, M$$

$$y_j \geq 0 \qquad \text{for all } j = 1, \ldots, N$$