Exercise 1:  Local search with GAMS/BARON

Consider the following pooling problem (Haverly, 1978):

\[
\begin{align*}
\text{min } & \quad -9x_5 - 15x_9 + 6x_1 + 16x_2 + 10x_6 \\
\text{s.t. } & \quad x_1 + x_2 = x_3 + x_4 \\
& \quad x_3 + x_7 = x_5 \\
& \quad x_4 + x_8 = x_9 \\
& \quad x_7 + x_8 = x_6 \\
& \quad x_{10}x_3 + 2x_7 \leq 2.5x_5 \\
& \quad x_{10}x_4 + 2x_8 \leq 1.5x_9 \\
& \quad 3x_1 + x_2 = x_{10}(x_3 + x_4) \\
& \quad (0,0,0,0,0,0,0,0,0,0) \leq x \\
& \quad x \leq (300,300,100,200,100,300,100,200,200,3)
\end{align*}
\]

Use GAMS/BARON to run 1000 local searches from randomly generated starting points (using suitable values for the numloc and maxiter options). Upon completion, plot a histogram of frequency vs. objective function values found (hint: use the locres option). Repeat the run of 1000 local searches after turning off range reduction (with the prelpdo, tdo, mdo, lbttdo, and obttdo options) so that the local search solver gets no benefit from BARON’s range reduction tools. Compare the results from the two runs.

Exercise 2:  Global optimization with GAMS/BARON

Copy the following globallib/minlplib problems from the GAMS web site:

- ex6_2_14
- gtm
- himmel16
- sambal
- du-opt, fac2, ravem, spectra2

Use GAMS/BARON to solve these problems. Experiment with the following algorithmic options (corresponding BARON options are shown in parentheses):

- branching strategy (brvarstra, brptstra, modbrpt)
- local search (numloc, dolocal)
- probing (prelpdo, pdo)
- reduction level (maxredpass, maxnodepass, tdo, lbttdo)
- termination tolerance (epsa, epsr).

Tabulate your results and discuss the relative importance of these algorithmic options.

Exercise 3:  Optimization under uncertainty

Refer to the following paper:


Consider the example in section 6.2 (right column of p. 4162). Write a GAMS code and reproduce the results described in the second and third paragraph of p. 4163.