Consider a process with the steady-state gain matrix

\[ K = \begin{bmatrix} 8.72 & 2.81 & 2.98 & -15.80 \\ 6.54 & -2.92 & 2.50 & -20.79 \\ -5.82 & 0.99 & -1.48 & -7.51 \\ -7.23 & 2.92 & 3.11 & 7.86 \end{bmatrix}. \]

Analysing this gain matrix by the Relative Gain Array (RGA), the Niederlinski Index (NI), and the Partial Relative Gain Array (PRG), find all variable pairings for multiloop SISO control that satisfy the requirements for integral controllability with integrity (ICI). If there are several control configurations that pass the ICI tests, try to rank them according to expected control performance from the best to the worst.

If you are using MATLAB to solve the problem, it is useful for you to construct functions for calculation of the RGA, the NI, and the PRG for arbitrary variable pairings (i.e., not necessarily pairing along the diagonal of \( K \)). These functions will be useful also in PWC/14/3.