ECH4905 ChemE Optimization HW 6

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1 Problem 1

Consider the following problem:

$$\begin{aligned} \text{minimize} \quad & Z_1(\mathbf{x}) = x_1^2 + x_2^2 + x_3^2 + x_4^2 + x_5^2, \\ & Z_2(\mathbf{x}) = 3x_1 + 2x_2 - x_3^3 + 0.01(x_4 - x_5)^3, \end{aligned}$$

subject to:

$$\begin{aligned} x_1 + 2x_2 - x_3 - 0.5x_4 + x_5 &= 2, \\ 4x_1 - 2x_2 + 0.8x_3 + 0.6x_4 + 0.5x_5^2 &= 0, \\ x_1^2 + x_2^2 + x_3^2 + x_4^2 + x_5^2 &\leq 10. \end{aligned}$$

1.1 Part A

Use the epsilon-constraint method to solve the above nonlinear programming (NLP) problem in GAMS. Upload your code.
Solution:

1.2 Part B

Create a plot with the Pareto front.
Solution: