ASSIGNMENT 5
CHE 5480

DUE: April 14: Send through e-mail. Include the GAMS and Excel files and a narrative explaining what was done and how.

#Problem 1
Consider problem 8.33 in Himmelblau.

1- Reformulate as an Indefinite quadratic problem
2- Construct a lower bound model (linear or nonlinear convex) and apply bound contraction to solve.
3- Solve to global optimality using branch and bound.

#Problem 2
Consider problem 8.38 in Himmelblau.

1- Solve using Successive Linearization
2- Reformulate as an Indefinite quadratic problem.
3- Construct a lower bound model (linear or nonlinear convex) and apply bound contraction to solve.
4- Use the lower bound model and solve to global optimality using branch and bound.

#Problem 3
Consider the following problem:

\[
\begin{align*}
\text{min} & \quad 7.5y_1 + 5.5y_2 + 7v_1 + 6v_2 + 5x \\
\text{s.t.} & \quad z_1 = 0.9[1 - \exp(-0.5v_1)]x_1 \\
& \quad z_2 = 0.8[1 - \exp(-0.4v_2)]x_2 \\
& \quad z_1 + z_2 - x = 0 \\
& \quad x_1 + x_2 = 10 \\
& \quad v_1 \leq 10y_1 \\
& \quad v_2 \leq 10y_2 \\
& \quad x_1 \leq 20y_1 \\
& \quad x_2 \leq 20y_2 \\
& \quad y_1 + y_2 = 1 \\
& \quad x_1, x_2, z_1, z_2, v_1, v_2 \geq 0 \\
& \quad y_1, y_2 \in \{0, 1\}^2
\end{align*}
\]

1- Reformulate if needed to obtain a convex lower bound.
2- Use image discretization on the nonlinear constraints and solve globally (Hint: this is unrelated to question 1)

====================================================================