HW 2 (Numerical Analysis)

Due: 2021/04/29

~~1. **[MATLAB]** Use the golden-section search (x_l = -2, x_u = 4, ε_s = 1%) to find the maximum of f(x) = 4x – 1.8x² + 1.2x³ – 0.3x⁴. Show your MATLAB code and the result in a table. Use may use the MATLAB code shown in Fig 7.7.~~

2. Given the system of equations:

$$-3x_2 + 7x_3 = 4$$
$$x_1 + 2x_2 - x_3 = 0$$
$$5x_1 - 2x_2 = 3$$

(a) Compute the determinant.
(b) Use Cramer's rule to solve for the x's.
(c) Use Gauss elimination with partial pivoting to solve for the x's. As part of the computation, calculate the determinant in order to verify the value computed in (a).
(d) Substitute your results back into the original equations to check your solution.

3. Use LU factorization to solve the following system of equations:

$$10x_1 - 2x_2 - x_3 = 27$$
$$-3x_1 - 6x_2 + 2x_3 = -61.5$$
$$x_1 + x_2 + 5x_3 = -21.5$$

Also solve the system for an alternative right-hand-side vector

$\{b\}^T = [\ 12\ 18\ -6]$.

4. Determine the inverse matrix of the following matrix A. Check your results by verifying that $[A][A]^{-1}$=I. Do not use a pivoting strategy.

$$[A]=\begin{bmatrix} 10 & 2 & -1 \\ -3 & -6 & 2 \\ 1 & 1 & 5 \end{bmatrix}$$

5. On the basis of the row-sum norm, determine the condition number of the following matrix:

$$[A]=\begin{bmatrix} 16 & 4 & 1 \\ 4 & 2 & 1 \\ 49 & 7 & 1 \end{bmatrix}$$