Assignment Three: Number of Solutions for a System of Equations

Math 264
Dr. Rebin Muhammad

Objective:

To write a Python function that determines the number of solutions for a system of equations provided in the form of an augmented matrix, utilizing the `Math264_RREF` function.

Prerequisites:

- Basic knowledge of conditional statement, loop and indexing.
- Installed `numpy` and `sympy` libraries.

Tasks:

1. Matrix Representation:

1. Convert your input list of lists into a numpy matrix and sympy matrix.
2. Utilize the `Math264_RREF` function to get the RREF of the matrix.

2. Analyzing the RREF:

[resume]Use loops to traverse through the rows of the RREF matrix to identify key characteristics. Use conditionals to check for rows that have all zeros except for the last column. If found, the system has no solution. Count the number of non-zero rows excluding the augmented column to determine the rank of the coefficient matrix. Based on the rank, determine if the system has a unique solution or infinite solutions.

Instructions:

1. Your function should be named `num_of_solutions` and accept a single argument: the augmented matrix.
2. The function should return:
   - "No solution" if the system has no solution.
   - "Unique solution" if the system has a unique solution.
   - "Infinite solutions" if the system has infinitely many solutions.
3. Ensure to include comments in your code for clarity.
4. Test your function with multiple augmented matrices to ensure its accuracy.

Submission:

Complete the tasks using Google Colab or any Python environment you're comfortable with. Once finished, share the link of your Colab notebook or submit the Python script.

Additional Resources:

For further reading and clarification on the Python concepts related to this assignment, students can refer to the notes available at this link.