IE310 ASSIGNMENT 2

I handled the assignment by creating a basic draft first. In this draft I decided methods I would implement and their order.

- I read the input file, determined the A|b matrix and the size of it.
- I implemented the pivotization method on the matrix.
- I implemented the Gauss-Jordan elimination method. Then I obtained a simplified matrix. This made my work easier while calculating the rank.
- I calculated the rank of the matrices than I categorize the matrices with if-else statements (unique soln., infinite soln. etc.)
- If the solution is unique or infinitely many, I obtained the results by implementing back substitution. In infinitely many soln., I handled the issue by mapping 0 to the nth variable.

The method of finding the inverse matrix

- I created the identity matrix to use its columns on A|I matrix.
- Since I already have the implementation of back substitution, I designed a new matrix called A|I which is a concatenation of the simplified A matrix and a column of the identity matrix. I used back substitute the A|I matrix n times so I obtained one column of the inverse matrix in each iteration.

The A|I matrix for the Data2 in each iteration respectively,

```
4 -2  1.0  1
0  1  3.0  0
0  0  7.5  0
```

```
4 -2  1.0  0
0  1  3.0  1
0  0  7.5  0
```

```
4 -2  1.0  0
0  1  3.0  0
0  0  7.5  1
```

- If the equation has no solution I specified it in the output.

OUTPUT:

```
Data 1:
The problem has infinely many solutions.
Arbitrary variable: Xn
Arbitrary solution(X1,...,Xn respectively): 6.6 1.8 0

Data 2:
The problem has a unique soln. The variables X1, ... Xn are respectively equal to: 1 -0.5 1.5

Inverted A:
0.25 0.5 0.166667
0 1 0.4
0 0 0.133333

Data 3:
The problem has no solution.
```

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