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CS 3010

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Programming Project 1: Gaussian Elimination with scale partial pivoting

Case 1:

Example given in the Assignment

```
Enter the number of equations (n <= 10): 3
Enter your 3 equations bellow:
Equation 1: 2x+3y = 8
Equation 2: -x+2y-z=0
Equation 3: 3x+2z=9

Make your selection on how you would like to input the coefficients:
1) Using command line
2) Using Files
1
Enter the coefficients incluing b values row by row:
Example for [3x3]:
                  A B C b1
                  D E F b2
                  G H I b3
2 3 0 8

-1 2 -1 0

3 0 2 9
=============== DISPLAY ===============
A[]=
  2.00     3.00     0.00
 -1.00     2.00    -1.00
  3.00     0.00     2.00

B[]= 8.0   0.0   9.0

========== SOLVING THE MATRIX ==========

Initial index[]= 0  1  2
Initial Scale[]= 3.0  2.0  3.0

Pivot row: 3
index[]= 0  1  2
r[]= 0.67  0.50  1.00

Pivot row: 2
index[]= 2  1  0
r[]= 0.67  1.00  1.00


********** FINAL ANSWER **********

Final index[]= 2  1  0
Final r[]= 0.67  1.00  1.00

X1= 1.00
X2= 2.00
X3= 3.00
```

Case 2:

Solvable - Book Example

```
Enter the number of equations (n <= 10): 4
Enter your 4 equations bellow:
Equation 1: 3x-13y+9z+3k=-19
Equation 2: -6x+4y+1z-18k=-34
Equation 3: 6x-2y+2z+4k=16
Equation 4: 12x-8y+6z+10k=26

Make your selection on how you would like to input the coefficients:
1) Using command line
2) Using Files
1
Enter the coefficients incluing b values row by row:
Example for [3x3]:
                  A B C b1
                  D E F b2
                  G H I b3
3 -13 9 3 -19
-6 4 1 -18 -34
6 -2 2 4 16
12 -8 6 10 26
=============== DISPLAY ===============
A[]=
  3.00   -13.00     9.00     3.00
 -6.00     4.00     1.00   -18.00
  6.00    -2.00     2.00     4.00
 12.00    -8.00     6.00    10.00

B[]= -19.0   -34.0   16.0   26.0

========== SOLVING THE MATRIX ==========

Initial index[]= 0  1  2  3
Initial Scale[]= 13.0  18.0  6.0  12.0

Pivot row: 3
index[]= 0  1  2  3
r[]= 0.23  0.33  1.00  1.00

Pivot row: 3
index[]= 2  1  0  3
r[]= 0.23  0.11  0.92  0.33

Pivot row: 3
index[]= 2  0  1  3
r[]= 0.23  0.11  0.24  0.06


********** FINAL ANSWER **********

Final index[]= 2  0  1  3
Final r[]= 0.23  0.11  0.24  0.06

X1= 3.00
X2= 1.00
X3= -2.00
X4= 1.00
```

Case 3:

Not diagonally Dominant - Not solvable

```
Enter the number of equations (n <= 10): 4
Enter your 4 equations bellow:
Equation 1: -2x+4y+1z+0k=0
Equation 2: -1x+0y+1z+6k=-14
Equation 3: 5x-2y-1z+1k=6
Equation 4: 1x+2y+6z-1k=6

Make your selection on how you would like to input the coefficients:
1) Using command line
2) Using Files
1
Enter the coefficients incluing b values row by row:
Example for [3x3]:
                  A B C b1
                  D E F b2
                  G H I b3
-2 4 1 0 0
-1 0 1 6 -14
5 -2 -1 1 6
1 2 6 -1 6
Exception in thread "main" java.lang.ArithmeticException: Matrix is singular! NOT SOLVABLE
        at GE_SPP_1.main(GE_SPP_1.java:105)
```