Gauss Elimination (1A)

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This document was produced by using OpenOffice.

Based on

Lab Manual for Linear Algebra
http://joshua.smcvt.edu/linearalgebra/lab.pdf

RDF

```
QQ : for the rational numbers
RR : for real numbers with arbitrary precision
RDF: for real numbers with double-length floats; for
CC : for the complex numbers with arbitrary precision
CDF: for the complex numbers with double floats
ZZ : for the integers.
```

RDF

```
M = matrix ( QQ, [[1,2,3],[4,5,6],[7,8,9]] )

M[1,2]
M.nrows()
M.ncols()

v = vector ( QQ , [2/3,-1/3,1/2] )

M1 = M.augment(v)
M1 = M.augment(v, subdivide=True)

M1 = M.swap_rows(0, 1)
M1 = M.rescale_row(0, 1/2)
M1 = M.add_multiple_of_the_row(2,0,-2)
```

RDF

```
M1.echelon_form()

M1.rref()

M1.pivots()
```

RDF

```
var ( 'x ,y ,z')

eqns = [ -3/4*z == -1 , 2*y + z == 2 , x + 2*z == 1/2 ]

solve ( eqns , x , y , z )


(x , y , z)
[[ x == (-13/6), y == (1/3) , z == (4/3) ]]
```

RDF

```
def check_nonsingular(mat):
    if not ( mat.is_square()):
        print " ERROR : mat must be square "
        return
    p = mat . pivots ()
    for col in range ( mat . ncols ()):
        if not ( col in p ):
            print " nonsingular "
            break


N = Matrix ( QQ , [[1,2,3], [4,5,6], [7,8,9]] )
check_nonsingular (N)
N = Matrix ( QQ , [[1,0,0], [0,1,0], [0,0,1]] )
check_nonsingular (N)
```

References

[1] http://joshua.smcvt.edu/linearalgebra/lab.pdf