



MATHEMATICS
TEXAS A&M UNIVERSITY

MATH 609
NUMERICAL ANALYSIS
FALL 2022
LAB 05
SUMMARY REPORT

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EXERCISE I: LU FACTORIZATION

```
PS C:\Users\melekderman\OneDrive - Texas A&M University\Desktop\Python\LABws\LAB5> python lab5_EX1.PY
A:
array([[ 1,  4,  6],
       [ 2,  6, 17],
       [ 1,  8, 19]])
P:
array([[0., 0., 1.],
       [1., 0., 0.],
       [0., 1., 0.]])
L:
array([[1., 0., 0.],
       [0.5, 1., 0.],
       [0.5, 0.2, 1.]])
U:
array([[ 2.,  6., 17.],
       [ 0.,  5., 10.5],
       [ 0.,  0., -4.6]])
LU:
array([[ 1.,  4.,  6.],
       [ 2.,  6., 17.],
       [ 1.,  8., 19.]])
x= [ 3.43478261 -0.13043478  1.34782609]
PS C:\Users\melekderman\OneDrive - Texas A&M University\Desktop\Python\LABws\LAB5> █
```

EXERCISE II: LU FACTORIZATION AND DETERMINANTS

Determinant V[5]	34560.0
Library Determinant V[5]	34560.00000000068
LU Factorization Determinant V[5]	34560.00000000068
Relative Error V[5]	1.9579399829833872e-14
Determinant V[6]	540878.9293239542
Library Determinant V[6]	540878.929323973
LU Factorization Determinant V[6]	540878.929323973
Relative Error V[6]	3.4867844009999983e-14
Determinant V[7]	10156679.95470089
Library Determinant V[7]	10156679.954752114
LU Factorization Determinant V[7]	10156679.954752114
Relative Error V[7]	5.043256441308217e-12
Determinant V[8]	226745102.0109039
Library Determinant V[8]	226745102.0109046
LU Factorization Determinant V[8]	226745102.0109046
Relative Error V[8]	3.154448457591343e-15
Determinant V[9]	5975270813.815859
Library Determinant V[9]	5975270813.676741
LU Factorization Determinant V[9]	5975270813.676741
Relative Error V[9]	2.3282324586596614e-11

Determinant V[10]	184813458539.84357
Library Determinant V[10]	184813458431.33395
LU Factorization Determinant V[10]	184813458431.33395
Relative Error V[10]	5.871304714191905e-10
Determinant V[11]	6677934263946.6045
Library Determinant V[11]	6677934275774.003
LU Factorization Determinant V[11]	6677934275774.003
Relative Error V[11]	1.7711163317906193e-09
Determinant V[12]	280801345525813.22
Library Determinant V[12]	280801355413104.84
LU Factorization Determinant V[12]	280801355413104.84
Relative Error V[12]	3.521098378814959e-08
Determinant V[13]	1.3695619732389884e+16
Library Determinant V[13]	1.3695619548293428e+16
LU Factorization Determinant V[13]	1.3695619548293428e+16
Relative Error V[13]	1.3441995294642661e-08
Determinant V[14]	7.726297303197827e+17
Library Determinant V[14]	7.726276719377132e+17
LU Factorization Determinant V[14]	7.726276719377132e+17
Relative Error V[14]	2.664124856614124e-06
Determinant V[15]	5.029371902691642e+19
Library Determinant V[15]	5.029349726240401e+19
LU Factorization Determinant V[15]	5.029349726240401e+19
Relative Error V[15]	4.409387826119343e-06
Determinant V[16]	3.7695270127032263e+21
Library Determinant V[16]	3.769322084453562e+21
LU Factorization Determinant V[16]	3.769322084453562e+21
Relative Error V[16]	5.436444651378512e-05
Determinant V[17]	3.246968826302076e+23
Library Determinant V[17]	3.2416810822197505e+23
LU Factorization Determinant V[17]	3.2416810822197505e+23
Relative Error V[17]	0.0016285170462655406
Determinant V[18]	3.2089711717354885e+25
Library Determinant V[18]	3.239941164111648e+25
LU Factorization Determinant V[18]	3.239941164111648e+25
Relative Error V[18]	0.00965106593943329
Determinant V[19]	3.633328878992119e+27
Library Determinant V[19]	4.095930241159624e+27
LU Factorization Determinant V[19]	4.095930241159624e+27
Relative Error V[19]	0.1273216319178434

Determinant V[20]	4.706678197716494e+29
Library Determinant V[20]	3.2289195048890545e+29
LU Factorization Determinant V[20]	3.2289195048890545e+29
Relative Error V[20]	0.31397062445110296
Determinant V[21]	6.967396315955429e+31
Library Determinant V[21]	4.124618691660686e+32
LU Factorization Determinant V[21]	4.124618691660686e+32
Relative Error V[21]	4.919885283711011
Determinant V[22]	1.1773241100842809e+34
Library Determinant V[22]	-4.400484058116078e+35
LU Factorization Determinant V[22]	-4.400484058116078e+35
Relative Error V[22]	38.3769977224119
Determinant V[23]	2.268590312764164e+36
Library Determinant V[23]	-2.5091214002579036e+39
LU Factorization Determinant V[23]	-2.5091214002579036e+39
Relative Error V[23]	1107.0266748651786

EXERCISE III: LU FACTORIZATION AND POLYNOMIAL INTERPOLATION

Figure for Inverse Multiplication:

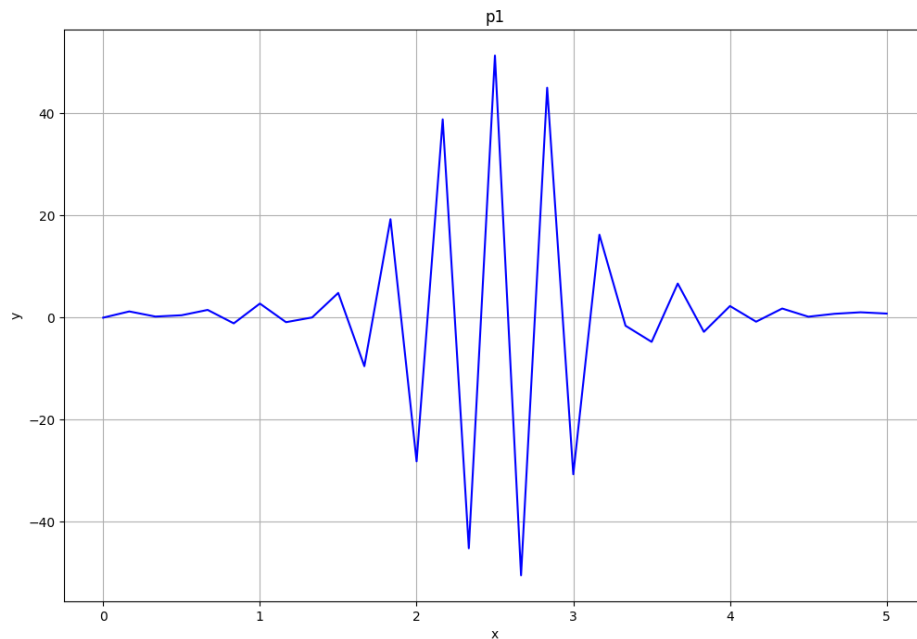


Figure for LU Decomposition:

