

Corrección

Boris Garcés

Tabla de Contenidos

Repositorio

<https://github.com/Boris-epn/prueba-correccion>

```
%load_ext autoreload
```

Examen

Determinante

```
import numpy as np
from src import (
    eliminacion_gaussiana,
    descomposicion_LU,
    resolver_LU,
    matriz_aumentada,
    separar_m_aumentada,
)

# Examen
## Determinante
def calc_determinante(A: list[list[float]]) -> float:
    """Función que calcula el determinante usando la descomposición LU.

    ## Parameters
    ``A``: Matriz cuadrada de tamaño n x n
```

```

## Return
``detA``: Determinante de la matriz A
"""

A = np.array(A, dtype=float)
L, U = descomposicion_LU(A)
detA = np.prod(np.diagonal(U))

return detA

```

Ejercicio 1

```

A1 = [
    [-4, 2, -4, -4, 1, 2, 5, 3, 5, 1],
    [1, 0, 4, 3, 0, -2, 3, 0, 1, 5],
    [5, 5, -4, 5, -4, 2, 2, 2, 4, 4],
    [-1, 3, 4, -1, -4, 0, 5, 0, 0, 5],
    [4, 1, 4, 2, 0, 0, 3, -1, 0, 2],
    [2, -2, 1, -1, -2, -3, 2, -2, 4, -1],
    [3, -2, -3, -2, -1, -3, 5, -1, 5, 0],
    [3, 4, -3, 3, -2, 2, -4, -4, 1, 5],
    [-4, 0, 3, 3, -3, -2, -2, 0, 5, -4],
    [-2, 4, 4, -2, -1, 1, 5, -1, 3, -3],
]
calc_determinante(A1)

```

[01-23 11:59:58] [INFO]

```

[[-4.    2.   -4.   -4.    1.    2.    5.    3.    5.    1. ]
 [ 0.    0.5   3.    2.    0.25 -1.5   4.25  0.75  2.25  5.25]
 [ 0.    7.5  -9.    0.   -2.75  4.5   8.25  5.75 10.25  5.25]
 [ 0.    2.5   5.    0.   -4.25 -0.5   3.75 -0.75 -1.25  4.75]
 [ 0.    3.    0.   -2.    1.    2.    8.    2.    5.    3. ]
 [ 0.   -1.   -1.   -3.   -1.5  -2.    4.5  -0.5   6.5  -0.5 ]
 [ 0.   -0.5  -6.   -5.   -0.25 -1.5   8.75  1.25  8.75  0.75]
 [ 0.    5.5  -6.    0.   -1.25  3.5  -0.25 -1.75  4.75  5.75]
 [ 0.   -2.    7.    7.   -4.   -4.   -7.   -3.    0.   -5. ]
 [ 0.    3.    6.    0.   -1.5   0.    2.5  -2.5   0.5  -3.5 ]]

```

[01-23 11:59:58] [INFO]

```

[[ -4.    2.   -4.   -4.    1.    2.    5.    3.    5.    1. ]
 [  0.    0.5   3.    2.    0.25 -1.5   4.25  0.75  2.25  5.25]]

```

```
[ 0.    0.   -54.   -30.    -6.5   27.   -55.5   -5.5  -23.5  -73.5 ]
[ 0.    0.   -10.   -10.    -5.5    7.   -17.5   -4.5  -12.5  -21.5 ]
[ 0.    0.   -18.   -14.    -0.5   11.   -17.5   -2.5   -8.5  -28.5 ]
[ 0.    0.    5.    1.    -1.    -5.    13.    1.    11.    10. ]
[ 0.    0.    -3.    -3.    0.    -3.    13.    2.    11.    6. ]
[ 0.    0.   -39.   -22.    -4.    20.   -47.   -10.   -20.   -52. ]
[ 0.    0.    19.    15.    -3.   -10.    10.    0.    9.    16. ]
[ 0.    0.   -12.   -12.    -3.    9.   -23.    -7.   -13.   -35. ]]
```

[01-23 11:59:58] [INFO]

```
[[-4.      2.      -4.      -4.      1.
   2.      5.      3.      5.      1.      ]
[ 0.      0.5     3.      2.      0.25
 -1.5     4.25    0.75    2.25    5.25      ]
[ 0.      0.      -54.     -30.     -6.5
 27.     -55.5    -5.5     -23.5    -73.5      ]
[ 0.      0.      0.      -4.44444444 -4.2962963
 2.      -7.22222222 -3.48148148 -8.14814815 -7.88888889]
[ 0.      0.      0.      -4.      1.66666667
 2.      1.      -0.66666667 -0.66666667 -4.      ]
[ 0.      0.      0.      -1.77777778 -1.60185185
 -2.5     7.86111111 0.49074074 8.82407407 3.19444444]
[ 0.      0.      0.      -1.33333333 0.36111111
 -4.5     16.08333333 2.30555556 12.30555556 10.08333333]
[ 0.      0.      0.      -0.33333333 0.69444444
 0.5     -6.91666667 -6.02777778 -3.02777778 1.08333333]
[ 0.      0.      0.      4.44444444 -5.28703704
 -0.5     -9.52777778 -1.93518519 0.73148148 -9.86111111]
[ 0.      0.      0.      -5.33333333 -1.55555556
 3.      -10.66666667 -5.77777778 -7.77777778 -18.66666667]]]
```

[01-23 11:59:58] [INFO]

```
[[-4.      2.      -4.      -4.      1.
   2.      5.      3.      5.      1.      ]
[ 0.      0.5     3.      2.      0.25
 -1.5     4.25    0.75    2.25    5.25      ]
[ 0.      0.      -54.     -30.     -6.5
 27.     -55.5    -5.5     -23.5    -73.5      ]
[ 0.      0.      0.      -4.44444444 -4.2962963
 2.      -7.22222222 -3.48148148 -8.14814815 -7.88888889]
[ 0.      0.      0.      0.      5.53333333
 0.2     7.5      2.46666667 6.66666667 3.1      ]
[ 0.      0.      0.      0.      0.11666667
 -3.3     10.75    1.88333333 12.08333333 6.35      ]
[ 0.      0.      0.      0.      1.65
```

```

-5.1      18.25      3.35      14.75      12.45      ]
[ 0.      0.      0.      0.      1.01666667
  0.35    -6.375    -5.76666667 -2.41666667  1.675      ]
[ 0.      0.      0.      0.      -9.58333333
  1.5     -16.75    -5.41666667 -7.41666667 -17.75      ]
[ 0.      0.      0.      0.      3.6
  0.6     -2.      -1.6      2.      -9.2      ]]

```

[01-23 11:59:58] [INFO]

```

[[-4.00000000e+00  2.00000000e+00 -4.00000000e+00 -4.00000000e+00
  1.00000000e+00  2.00000000e+00  5.00000000e+00  3.00000000e+00
  5.00000000e+00  1.00000000e+00]
[ 0.00000000e+00  5.00000000e-01  3.00000000e+00  2.00000000e+00
  2.50000000e-01 -1.50000000e+00  4.25000000e+00  7.50000000e-01
  2.25000000e+00  5.25000000e+00]
[ 0.00000000e+00  0.00000000e+00 -5.40000000e+01 -3.00000000e+01
 -6.50000000e+00  2.70000000e+01 -5.55000000e+01 -5.50000000e+00
 -2.35000000e+01 -7.35000000e+01]
[ 0.00000000e+00  0.00000000e+00  0.00000000e+00 -4.44444444e+00
 -4.29629630e+00  2.00000000e+00 -7.22222222e+00 -3.48148148e+00
 -8.14814815e+00 -7.88888889e+00]
[ 0.00000000e+00  0.00000000e+00  0.00000000e+00  0.00000000e+00
  5.53333333e+00  2.00000000e-01  7.50000000e+00  2.46666667e+00
  6.66666667e+00  3.10000000e+00]
[ 0.00000000e+00  0.00000000e+00  0.00000000e+00  0.00000000e+00
  0.00000000e+00 -3.30421687e+00  1.05918675e+01  1.83132530e+00
  1.19427711e+01  6.28463855e+00]
[ 0.00000000e+00  0.00000000e+00  0.00000000e+00  0.00000000e+00
 -2.22044605e-16 -5.15963855e+00  1.60135542e+01  2.61445783e+00
  1.27620482e+01  1.15256024e+01]
[ 0.00000000e+00  0.00000000e+00  0.00000000e+00  0.00000000e+00
  0.00000000e+00  3.13253012e-01 -7.75301205e+00 -6.21987952e+00
 -3.64156627e+00  1.10542169e+00]
[ 0.00000000e+00  0.00000000e+00  0.00000000e+00  0.00000000e+00
  0.00000000e+00  1.84638554e+00 -3.76054217e+00 -1.14457831e+00
  4.12951807e+00 -1.23810241e+01]
[ 0.00000000e+00  0.00000000e+00  0.00000000e+00  0.00000000e+00
  0.00000000e+00  4.69879518e-01 -6.87951807e+00 -3.20481928e+00
 -2.33734940e+00 -1.12168675e+01]]

```

[01-23 11:59:58] [INFO]

```

[[-4.00000000e+00  2.00000000e+00 -4.00000000e+00 -4.00000000e+00
  1.00000000e+00  2.00000000e+00  5.00000000e+00  3.00000000e+00
  5.00000000e+00  1.00000000e+00]
[ 0.00000000e+00  5.00000000e-01  3.00000000e+00  2.00000000e+00

```

```

2.50000000e-01 -1.50000000e+00 4.25000000e+00 7.50000000e-01
2.25000000e+00 5.25000000e+00]
[ 0.00000000e+00 0.00000000e+00 -5.40000000e+01 -3.00000000e+01
-6.50000000e+00 2.70000000e+01 -5.55000000e+01 -5.50000000e+00
-2.35000000e+01 -7.35000000e+01]
[ 0.00000000e+00 0.00000000e+00 0.00000000e+00 -4.44444444e+00
-4.29629630e+00 2.00000000e+00 -7.22222222e+00 -3.48148148e+00
-8.14814815e+00 -7.88888889e+00]
[ 0.00000000e+00 0.00000000e+00 0.00000000e+00 0.00000000e+00
5.53333333e+00 2.00000000e-01 7.50000000e+00 2.46666667e+00
6.66666667e+00 3.10000000e+00]
[ 0.00000000e+00 0.00000000e+00 0.00000000e+00 0.00000000e+00
0.00000000e+00 -3.30421687e+00 1.05918675e+01 1.83132530e+00
1.19427711e+01 6.28463855e+00]
[ 0.00000000e+00 0.00000000e+00 0.00000000e+00 0.00000000e+00
-2.22044605e-16 0.00000000e+00 -5.25979945e-01 -2.45214221e-01
-5.88696445e+00 1.71194166e+00]
[ 0.00000000e+00 0.00000000e+00 0.00000000e+00 0.00000000e+00
0.00000000e+00 0.00000000e+00 -6.74886053e+00 -6.04626253e+00
-2.50934366e+00 1.70123063e+00]
[ 0.00000000e+00 0.00000000e+00 0.00000000e+00 0.00000000e+00
0.00000000e+00 0.00000000e+00 2.15815861e+00 -1.21239745e-01
1.08030994e+01 -8.86918870e+00]
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-6.39015497e-01 -1.03231541e+01]]
[01-23 11:59:58] [INFO]
[[-4.00000000e+00 2.00000000e+00 -4.00000000e+00 -4.00000000e+00
1.00000000e+00 2.00000000e+00 5.00000000e+00 3.00000000e+00
5.00000000e+00 1.00000000e+00]
[ 0.00000000e+00 5.00000000e-01 3.00000000e+00 2.00000000e+00
2.50000000e-01 -1.50000000e+00 4.25000000e+00 7.50000000e-01
2.25000000e+00 5.25000000e+00]
[ 0.00000000e+00 0.00000000e+00 -5.40000000e+01 -3.00000000e+01
-6.50000000e+00 2.70000000e+01 -5.55000000e+01 -5.50000000e+00
-2.35000000e+01 -7.35000000e+01]
[ 0.00000000e+00 0.00000000e+00 0.00000000e+00 -4.44444444e+00
-4.29629630e+00 2.00000000e+00 -7.22222222e+00 -3.48148148e+00
-8.14814815e+00 -7.88888889e+00]
[ 0.00000000e+00 0.00000000e+00 0.00000000e+00 0.00000000e+00
5.53333333e+00 2.00000000e-01 7.50000000e+00 2.46666667e+00
6.66666667e+00 3.10000000e+00]
[ 0.00000000e+00 0.00000000e+00 0.00000000e+00 0.00000000e+00

```

```

0.00000000e+00 -3.30421687e+00 1.05918675e+01 1.83132530e+00
1.19427711e+01 6.28463855e+00]
[ 0.00000000e+00 0.00000000e+00 0.00000000e+00 0.00000000e+00
-2.22044605e-16 0.00000000e+00 -5.25979945e-01 -2.45214221e-01
-5.88696445e+00 1.71194166e+00]
[ 0.00000000e+00 0.00000000e+00 0.00000000e+00 0.00000000e+00
0.00000000e+00 0.00000000e+00 0.00000000e+00 -2.89991334e+00
7.30264298e+01 -2.02647314e+01]
[ 0.00000000e+00 0.00000000e+00 0.00000000e+00 0.00000000e+00
0.00000000e+00 0.00000000e+00 0.00000000e+00 -1.12738302e+00
-1.33518198e+01 -1.84488735e+00]
[ 0.00000000e+00 0.00000000e+00 0.00000000e+00 0.00000000e+00
0.00000000e+00 0.00000000e+00 0.00000000e+00 -4.39341421e-01
5.95008666e+01 -2.78119584e+01]]
[01-23 11:59:58] [INFO]
[[-4.00000000e+00 2.00000000e+00 -4.00000000e+00 -4.00000000e+00
1.00000000e+00 2.00000000e+00 5.00000000e+00 3.00000000e+00
5.00000000e+00 1.00000000e+00]
[ 0.00000000e+00 5.00000000e-01 3.00000000e+00 2.00000000e+00
2.50000000e-01 -1.50000000e+00 4.25000000e+00 7.50000000e-01
2.25000000e+00 5.25000000e+00]
[ 0.00000000e+00 0.00000000e+00 -5.40000000e+01 -3.00000000e+01
-6.50000000e+00 2.70000000e+01 -5.55000000e+01 -5.50000000e+00
-2.35000000e+01 -7.35000000e+01]
[ 0.00000000e+00 0.00000000e+00 0.00000000e+00 -4.44444444e+00
-4.29629630e+00 2.00000000e+00 -7.22222222e+00 -3.48148148e+00
-8.14814815e+00 -7.88888889e+00]
[ 0.00000000e+00 0.00000000e+00 0.00000000e+00 0.00000000e+00
5.53333333e+00 2.00000000e-01 7.50000000e+00 2.46666667e+00
6.66666667e+00 3.10000000e+00]
[ 0.00000000e+00 0.00000000e+00 0.00000000e+00 0.00000000e+00
0.00000000e+00 -3.30421687e+00 1.05918675e+01 1.83132530e+00
1.19427711e+01 6.28463855e+00]
[ 0.00000000e+00 0.00000000e+00 0.00000000e+00 0.00000000e+00
-2.22044605e-16 0.00000000e+00 -5.25979945e-01 -2.45214221e-01
-5.88696445e+00 1.71194166e+00]
[ 0.00000000e+00 0.00000000e+00 0.00000000e+00 0.00000000e+00
0.00000000e+00 0.00000000e+00 0.00000000e+00 -2.89991334e+00
7.30264298e+01 -2.02647314e+01]
[ 0.00000000e+00 0.00000000e+00 0.00000000e+00 0.00000000e+00
0.00000000e+00 0.00000000e+00 0.00000000e+00 0.00000000e+00
-4.17418945e+01 6.03331839e+00]
[ 0.00000000e+00 0.00000000e+00 0.00000000e+00 0.00000000e+00

```

```

0.00000000e+00 0.00000000e+00 0.00000000e+00 0.00000000e+00
4.84372479e+01 -2.47418198e+01]]
[01-23 11:59:58] [INFO]
[[-4.00000000e+00 2.00000000e+00 -4.00000000e+00 -4.00000000e+00
1.00000000e+00 2.00000000e+00 5.00000000e+00 3.00000000e+00
5.00000000e+00 1.00000000e+00]
[ 0.00000000e+00 5.00000000e-01 3.00000000e+00 2.00000000e+00
2.50000000e-01 -1.50000000e+00 4.25000000e+00 7.50000000e-01
2.25000000e+00 5.25000000e+00]
[ 0.00000000e+00 0.00000000e+00 -5.40000000e+01 -3.00000000e+01
-6.50000000e+00 2.70000000e+01 -5.55000000e+01 -5.50000000e+00
-2.35000000e+01 -7.35000000e+01]
[ 0.00000000e+00 0.00000000e+00 0.00000000e+00 -4.44444444e+00
-4.29629630e+00 2.00000000e+00 -7.22222222e+00 -3.48148148e+00
-8.14814815e+00 -7.88888889e+00]
[ 0.00000000e+00 0.00000000e+00 0.00000000e+00 0.00000000e+00
5.53333333e+00 2.00000000e-01 7.50000000e+00 2.46666667e+00
6.66666667e+00 3.10000000e+00]
[ 0.00000000e+00 0.00000000e+00 0.00000000e+00 0.00000000e+00
0.00000000e+00 -3.30421687e+00 1.05918675e+01 1.83132530e+00
1.19427711e+01 6.28463855e+00]
[ 0.00000000e+00 0.00000000e+00 0.00000000e+00 0.00000000e+00
-2.22044605e-16 0.00000000e+00 -5.25979945e-01 -2.45214221e-01
-5.88696445e+00 1.71194166e+00]
[ 0.00000000e+00 0.00000000e+00 0.00000000e+00 0.00000000e+00
0.00000000e+00 0.00000000e+00 0.00000000e+00 -2.89991334e+00
7.30264298e+01 -2.02647314e+01]
[ 0.00000000e+00 0.00000000e+00 0.00000000e+00 0.00000000e+00
0.00000000e+00 0.00000000e+00 0.00000000e+00 0.00000000e+00
-4.17418945e+01 6.03331839e+00]
[ 0.00000000e+00 0.00000000e+00 0.00000000e+00 0.00000000e+00
0.00000000e+00 0.00000000e+00 0.00000000e+00 0.00000000e+00
0.00000000e+00 -1.77407639e+01]]
[01-23 11:59:58] [INFO]
[[-4.00000000e+00 2.00000000e+00 -4.00000000e+00 -4.00000000e+00
1.00000000e+00 2.00000000e+00 5.00000000e+00 3.00000000e+00
5.00000000e+00 1.00000000e+00]
[ 0.00000000e+00 5.00000000e-01 3.00000000e+00 2.00000000e+00
2.50000000e-01 -1.50000000e+00 4.25000000e+00 7.50000000e-01
2.25000000e+00 5.25000000e+00]
[ 0.00000000e+00 0.00000000e+00 -5.40000000e+01 -3.00000000e+01
-6.50000000e+00 2.70000000e+01 -5.55000000e+01 -5.50000000e+00
-2.35000000e+01 -7.35000000e+01]

```

```
[ 0.00000000e+00  0.00000000e+00  0.00000000e+00 -4.44444444e+00
-4.29629630e+00  2.00000000e+00 -7.22222222e+00 -3.48148148e+00
-8.14814815e+00 -7.88888889e+00]
[ 0.00000000e+00  0.00000000e+00  0.00000000e+00  0.00000000e+00
 5.53333333e+00  2.00000000e-01  7.50000000e+00  2.46666667e+00
 6.66666667e+00  3.10000000e+00]
[ 0.00000000e+00  0.00000000e+00  0.00000000e+00  0.00000000e+00
 0.00000000e+00 -3.30421687e+00  1.05918675e+01  1.83132530e+00
 1.19427711e+01  6.28463855e+00]
[ 0.00000000e+00  0.00000000e+00  0.00000000e+00  0.00000000e+00
-2.22044605e-16  0.00000000e+00 -5.25979945e-01 -2.45214221e-01
-5.88696445e+00  1.71194166e+00]
[ 0.00000000e+00  0.00000000e+00  0.00000000e+00  0.00000000e+00
 0.00000000e+00  0.00000000e+00  0.00000000e+00 -2.89991334e+00
 7.30264298e+01 -2.02647314e+01]
[ 0.00000000e+00  0.00000000e+00  0.00000000e+00  0.00000000e+00
 0.00000000e+00  0.00000000e+00  0.00000000e+00  0.00000000e+00
-4.17418945e+01  6.03331839e+00]
[ 0.00000000e+00  0.00000000e+00  0.00000000e+00  0.00000000e+00
 0.00000000e+00  0.00000000e+00  0.00000000e+00  0.00000000e+00
 0.00000000e+00 -1.77407639e+01]]
```

```
np.float64(9912776.000000015)
```

Ejercicio 2

```
A2 = [
    [2, 2, 4, 5, -2, -3, 2, -2],
    [-1, -1, 3, 2, 1, 1, -4, 4],
    [2, 5, -3, -3, -2, 2, 5, 3],
    [-2, -4, 0, 1, -1, 5, -4, -1],
    [1, -2, -1, 5, 5, 2, 1, -2],
    [5, 4, 0, 3, 4, -1, -3, -2],
    [4, -4, 1, 2, 3, 3, -1, 3],
    [-2, 1, -3, 0, 5, 4, 4, -4],
]
calc_determinante(A2)
```

[01-23 12:00:02] [INFO]