Correcion Examen

```
%load_ext autoreload
```

Repositorio:https://github.com/BelenRaura/CorrecionPII

Determinante

```python
%load_ext autoreload
%autoreload 2
from src import (
    eliminacion_gaussiana,
    descomposicion_LU,
    resolver_LU,
    matriz_aumentada,
    separar_m_aumentada,
)


# ####################################################################
def calc_determinante(A: list[list[float]]) -> float:
    """Función que calcula el determinante usando el método
    [Descomposición LU, eliminación gaussiana, Gauss-Jordan, Gauss-Jacobi o Gauss-Seidel]

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

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

    """
    # completar
```

```
    from src import descomposicion_LU

    det = 1
    L, U = descomposicion_LU(A)


    for i in range(0, len(U)):
        det *= U[i][i]

    return det
```

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],
]
print(
calc_determinante(A1))
```

```
[01-11 12:06:22][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 ]]
```
[01-11 12:06:22][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.  ]]
```
[01-11 12:06:22][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]]
```
[01-11 12:06:22][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        ]]
```
[01-11 12:06:22][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]]
```

[01-11 12:06:22][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]
 [0.00000000e+00 0.00000000e+00 0.00000000e+00 0.00000000e+00
   0.00000000e+00 0.00000000e+00 -5.37329079e+00 -2.94439380e+00
  -6.39015497e-01 -1.03231541e+01]]
[01-11 12:06:22][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]]
[01-11 12:06:22][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]]
[01-11 12:06:22][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]]
[01-11 12:06:22][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]]
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],
]
```

```
try:
    print(calc_determinante(A2))
except ValueError as e:
    print(e)
```

```
[01-11 12:14:51][INFO]
[[ 2.    2.    4.    5.   -2.   -3.    2.   -2. ]
 [ 0.    0.    5.    4.5   0.   -0.5  -3.    3. ]
 [ 0.    3.   -7.   -8.    0.    5.    3.    5. ]
 [ 0.   -2.    4.    6.   -3.    2.   -2.   -3. ]
 [ 0.   -3.   -3.    2.5   6.    3.5   0.   -1. ]
 [ 0.   -1.  -10.   -9.5   9.    6.5  -8.    3. ]
 [ 0.   -8.   -7.   -8.    7.    9.   -5.    7. ]
 [ 0.    3.    1.    5.    3.    1.    6.   -6. ]]
No existe solución única.
```