acse_la¶

A Gaussian Elimination routine¶

This package implements Gaussian elimination 1 for `numpy.ndarray` objects, along with hand-written matrix multiplication.

See `acse_la.gauss()` and `acse_la.gauss.matmul()` for more information.

`acse_la.gauss`(*a*, *b*)¶

Given two matrices, *a* and *b*, with *a* square, the determinant of *a* and a matrix *x* such that a*x = b are returned. If *b* is the identity, then *x* is the inverse of *a*.

Parameters

- **a** (*np.array or list of lists*) – 'n x n' array
- **b** (*np. array or list of lists*) – 'm x n' array

Examples

```
>>> a = [[2, 0, -1], [0, 5, 6], [0, -1, 1]]
>>> b = [[2], [1], [2]]
>>> det, x = gauss(a, b)
>>> det
22.0
>>> x
[[1.5], [-1.0], [1.0]]
>>> A = [[1, 0, -1], [-2, 3, 0], [1, -3, 2]]
>>> I = [[1, 0, 0], [0, 1, 0], [0, 0, 1]]
>>> Det, Ainv = gauss(A, I)
>>> Det
3.0
>>> Ainv
[[2.0, 1.0, 1.0],
[1.3333333333333333, 1.0, 0.6666666666666666],
[1.0, 1.0, 1.0]]
```

Notes

See https://en.wikipedia.org/wiki/Gaussian_elimination for further details.

`acse_la.gauss.matmul`(*a*, *b*)

Given two matrices, *a* and *b*, return the matrix multiplication 'a*b'

Parameters

- **a** (*np.array or list of lists*) – 'n x p' array
- **b** (*np. array or list of lists*) – 'p1 x q' array

Examples

```
>>> a = [[2, 0, -1], [0, 5, 6], [0, -1, 1]]
>>> b = [[1, 0, 0], [0, 1, 0], [0, 0, 1]]
>>> c = matmul(a, b)
>>> c
[[2, 0, -1],
[0, 5, 6],
[0, -1, 1]]
```

Notes

resource: https://en.wikipedia.org/wiki/Matrix_multiplication

`acse_la.gauss.zeromat`(*p*, *q*)

Given matirx size, *p* and *q*, return a p*w null matrix

Parameters

- **p** (*int*) – row size

- **q** (*int*) – column size

Examples

```
>>> p = 3
>>> q = 3
>>> a = zeromat(p, q)
>>> a
[[0, 0, 0],
[0, 0, 0],
[0, 0, 0]]
```

Notes

See https://en.wikipedia.org/wiki/Zero_matrix for further details.

References

1

https://mathworld.wolfram.com/GaussianElimination.html

ACSE_la

Navigation

Related Topics

- Documentation overview