functions

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CHAPTER

ONE

MPM_LA

1.1 mpm_la package

1.1.1 Submodules

1.1.2 mpm_la.functions module

mpm_la.functions.**adj**(*a*)

Given a martix *a*, return its adjugate matrix or *None* if its adjugate matrix does not exist.

Parameters

a

[np.array or list of lists] 'n x m' array

Returns

adj1

[np.ndarray or None] The determinant of *a*.

Examples

```
>>> a = [[1,0,-1],[-2,3,0],[1,-3,2]]
>>> d = adj(a)
>>> d
array([[6., 3., 3.],
       [4., 3., 2.],
       [3., 3., 3.]])
```

```
>>> a = [[1,5,-1],[-2,3,0],[1,-8,2]]
>>> d = adj(a)
>>> d
array([[ 6., -2.,  3.],
       [ 4.,  3.,  2.],
       [13., 13., 13.]])
```

Notes

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

mpm_la.functions.**det**(*a*)

Given a martix *a*, return its determinat or *None* if its determinant does not exist.

Parameters

a
: [np.array or list of lists] 'n x m' array

Returns

det
: [np.float64 or None] The determinant of *a*.

Examples

```
>>> a = [[2, 0, -1], [0, 5, 6], [0, -1, 1]]
>>> d = det(a)
>>> d
22.0
```

```
>>> a = [[2, 0, -1], [0, 5, 6]]
>>> d = det(a)
>>> d
```

```
>>> a = [[1, 3, 2, 4], [2, 4, 5, 2], [2, 1, 3, 3], [4, 2, 1, 6]]
>>> d = det(a)
>>> d
-100.0
```

Notes

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

mpm_la.functions.**inv**(*a*)

Given a martix *a*, return its inverse matrix or *None* if its inverse matrix does not exist.

Parameters

a
: [np.array or list of lists] 'n x m' array

Returns

a_inv
[np.ndarray or None] The determinant of *a*.

Examples

```
>>> a = [[1,0,-1],[-2,3,0],[1,-3,2]]
>>> d = inv(a)
>>> d
array([[2.        , 1.        , 1.        ],
       [1.33333333, 1.        , 0.66666667],
       [1.        , 1.        , 1.        ]])
```

```
>>> a = [[1,3,-1],[-2,2,0],[1,-7,2]]
>>> d = inv(a)
>>> d
array([[1.  , 0.25, 0.5 ],
       [1.  , 0.75, 0.5 ],
       [3.  , 2.5 , 2.  ]])
```

Notes

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

mpm_la.functions.**mult**(*a*, *b*)
Given two martices *a* and *b*, return their multipilication or *None* if their multipilication does not exist.

Parameters

a
[np.array or list of lists] 'n x m' array

b
[np.array or list of lists] 'm x l' array

Returns

mult1
[np.ndarray or None] The multipilication of *a* and *b*.

Examples

```
>>> a = [[1, 2], [3, 4]]
>>> b = [[5], [6]]
>>> d = mult(a, b)
>>> d
array([[17.],
       [39.]])
```

```
>>> a = [[1, 2], [3, 4]]
>>> b = [[5, 1], [6, 2]]
>>> d = mult(a, b)
>>> d
array([[17.,  5.],
       [39., 11.]])
```

Notes

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

mpm_la.functions.**solve**(*a*, *b*)

Given two martices *a* and *b*, for a linear system composed of them form ax = b, return its solution x or *None* if its cannot be solved.

Parameters

a

[np.array or list of lists] 'n x m' array

b

[np.array or list of lists] 'n x 1' array

Returns

det_b

[np.ndarray or None] The determinant of *a*.

Examples

```
>>> a = [[1, 1, 1], [-1, 1, 1],[-1, -1, 1]]
>>> b = [[1], [2], [-1]]
>>> d = solve(a, b)
>>> d
array([[-0.5],
       [ 1.5],
       [ 0. ]])
```

```
>>> a = [[1, 4, 1], [-1, 3, 1],[-1, -1, 1]]
>>> b = [[1], [2], [-1]]
>>> d = solve(a, b)
>>> d
array([[-0.875],
       [ 0.75 ],
       [-1.125]])
```

Notes

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

1.1.3 Module contents

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