

Task1:

active environment : None
user config file : C:\Users\KRQ\.condarc
populated config files : C:\Users\KRQ\.condarc
conda version : 4.13.0
conda-build version : 3.21.8
python version : 3.9.12.final.0
virtual packages : __cuda=11.6=0
 __win=0=0
 __archspec=1=x86_64
base environment : D:\Anaconda (writable)
conda av data dir : D:\Anaconda\etc\conda
conda av metadata url : None
channel URLs : https://repo.anaconda.com/pkgs/main/win-64
 https://repo.anaconda.com/pkgs/main/noarch
 https://repo.anaconda.com/pkgs/r/win-64
 https://repo.anaconda.com/pkgs/r/noarch
 https://repo.anaconda.com/pkgs/msys2/win-64
 https://repo.anaconda.com/pkgs/msys2/noarch
package cache : D:\Anaconda\pkgs
 C:\Users\KRQ\.conda\pkgs
 C:\Users\KRQ\AppData\Local\conda\conda\pkgs
envs directories : D:\Anaconda\envs
 C:\Users\KRQ\.conda\envs
 C:\Users\KRQ\AppData\Local\conda\conda\envs
platform : win-64
user-agent : conda/4.13.0 requests/2.27.1 CPython/3.9.12 Windows/10
Windows/10.0.22000
administrator : True
netrc file : None
offline mode : False

Task2:

```
In [1]: import numpy as np
In [2]: import scipy.linalg
In [3]: a=[1,2,3,4,5]
In [4]: np.ndim(a)
Out[4]: 1
In [5]: np.size(a)
Out[5]: 5
In [6]: np.shape(a)
```

```

Out[6]: (5,)
In [8]: b=np.array([[1,2,3,4],[5,6,7,8]])
In [9]: b.shape
Out[9]: (2, 4)
In [10]: c=np.block([[1,2],[3,4]])
In [11]: c
Out[11]:
array([[1, 2],
       [3, 4]])
In [12]: a[-1]
Out[12]: 5
In [14]: b[1,3]
Out[14]: 8
In [15]: b[1]
Out[15]: array([5, 6, 7, 8])
In [17]: b[:3]
Out[17]:
array([[1, 2, 3, 4],
       [5, 6, 7, 8]])
In [18]: b[:2]
Out[18]:
array([[1, 2, 3, 4],
       [5, 6, 7, 8]])
In [19]: b[0:1,2:3]
Out[19]: array([[3]])
In [21]: b[np.ix_([0,1],[2,3])]
Out[21]:
array([[3, 4],
       [7, 8]])
In[22]:
c=np.array([[1,2,3,4,5,6,7,8,9,10],[11,12,13,14,15,16,17,18,19,20],[21,22,23,24,25,26,
27,28,29,30]])
In [23]: c[:,2:7:2]
Out[23]:
array([[ 3,  5,  7],
       [13, 15, 17],
       [23, 25, 27]])
In [24]: c[:,::2]
Out[24]:
array([[ 1,  3,  5,  7,  9],
       [11, 13, 15, 17, 19],
       [21, 23, 25, 27, 29]])
In [25]: c[:,::-1]
Out[25]:

```

```
array([[10, 9, 8, 7, 6, 5, 4, 3, 2, 1],
       [20, 19, 18, 17, 16, 15, 14, 13, 12, 11],
       [30, 29, 28, 27, 26, 25, 24, 23, 22, 21]])
```

```
In [26]: c[np.r_[:len(c),0]]
```

```
Out[26]:
```

```
array([[ 1,  2,  3,  4,  5,  6,  7,  8,  9, 10],
       [11, 12, 13, 14, 15, 16, 17, 18, 19, 20],
       [21, 22, 23, 24, 25, 26, 27, 28, 29, 30],
       [ 1,  2,  3,  4,  5,  6,  7,  8,  9, 10]])
```

```
In [28]: c.transpose()
```

```
Out[28]:
```

```
array([[ 1, 11, 21],
       [ 2, 12, 22],
       [ 3, 13, 23],
       [ 4, 14, 24],
       [ 5, 15, 25],
       [ 6, 16, 26],
       [ 7, 17, 27],
       [ 8, 18, 28],
       [ 9, 19, 29],
       [10, 20, 30]])
```

```
In [29]: c.conj().transpose()
```

```
Out[29]:
```

```
array([[ 1, 11, 21],
       [ 2, 12, 22],
       [ 3, 13, 23],
       [ 4, 14, 24],
       [ 5, 15, 25],
       [ 6, 16, 26],
       [ 7, 17, 27],
       [ 8, 18, 28],
       [ 9, 19, 29],
       [10, 20, 30]])
```

```
In [30]: x=np.array([[1,2],[3,4]])
```

```
In [33]: y=np.array([[1,-1],[-1,1]])
```

```
In [34]: x*y
```

```
Out[34]:
```

```
array([[ 1, -2],
       [-3,  4]])
```

```
In [36]: x@y
```

```
Out[36]:
```

```
array([[ -1,  1],
       [-1,  1]])
```

In [37]: x**2

Out[37]:

```
array([[ 1,  4],
       [ 9, 16]], dtype=int32)
```

In [38]: (x>2)

Out[38]:

```
array([[False, False],
       [ True,  True]])
```

In [39]: np.nonzero(x>2)

Out[39]: (array([1, 1], dtype=int64), array([0, 1], dtype=int64))

In [40]: x[:,np.nonzero(x>2)[0]]

Out[40]:

```
array([[2, 2],
       [4, 4]])
```

In [41]: z=x[1,:].copy()

In [42]: z

Out[42]: array([3, 4])

In [43]: x.flatten()

Out[43]: array([1, 2, 3, 4])

In [46]: a=np.arange(1,11.)

In [47]: a

Out[47]: array([1., 2., 3., 4., 5., 6., 7., 8., 9., 10.])

In [49]: b=np.zeros((3,4))

In [50]: b

Out[50]:

```
array([[0., 0., 0., 0.],
       [0., 0., 0., 0.],
       [0., 0., 0., 0.]])
```

In [51]: c=np.ones((3,4))

In [52]: c

Out[52]:

```
array([[1., 1., 1., 1.],
       [1., 1., 1., 1.],
       [1., 1., 1., 1.]])
```

In [54]: d=np.eye(3)

In [55]: d

Out[55]:

```
array([[1., 0., 0.],
       [0., 1., 0.],
       [0., 0., 1.]])
```

```
In [56]: np.diag(d)
```

```
Out[56]: array([1., 1., 1.])
```

```
In [57]: np.linspace(1,3,4)
```

```
Out[57]: array([1.          , 1.66666667, 2.33333333, 3.          ])
```

```
In [58]: np.mgrid[0:9,0:6.]
```

```
Out[58]:
```

```
array([[[0., 0., 0., 0., 0., 0.],
        [1., 1., 1., 1., 1., 1.],
        [2., 2., 2., 2., 2., 2.],
        [3., 3., 3., 3., 3., 3.],
        [4., 4., 4., 4., 4., 4.],
        [5., 5., 5., 5., 5., 5.],
        [6., 6., 6., 6., 6., 6.],
        [7., 7., 7., 7., 7., 7.],
        [8., 8., 8., 8., 8., 8.]],
```

```
        [[0., 1., 2., 3., 4., 5.],
        [0., 1., 2., 3., 4., 5.],
        [0., 1., 2., 3., 4., 5.],
        [0., 1., 2., 3., 4., 5.],
        [0., 1., 2., 3., 4., 5.],
        [0., 1., 2., 3., 4., 5.],
        [0., 1., 2., 3., 4., 5.],
        [0., 1., 2., 3., 4., 5.],
        [0., 1., 2., 3., 4., 5.]])
```

```
In [60]: np.meshgrid([1,2,4],[2,4,5])
```

```
Out[60]:
```

```
[array([[1, 2, 4],
        [1, 2, 4],
        [1, 2, 4]]),
 array([[2, 2, 2],
        [4, 4, 4],
        [5, 5, 5]])]
```

```
In [61]: c.max()
```

```
Out[61]: 1.0
```

```
In [63]: np.maximum(b,c)
```

```
Out[63]:
```

```
array([[1., 1., 1., 1.],
        [1., 1., 1., 1.],
        [1., 1., 1., 1.]])
```

```
In [64]: v=np.array([1,4,5,3])
```

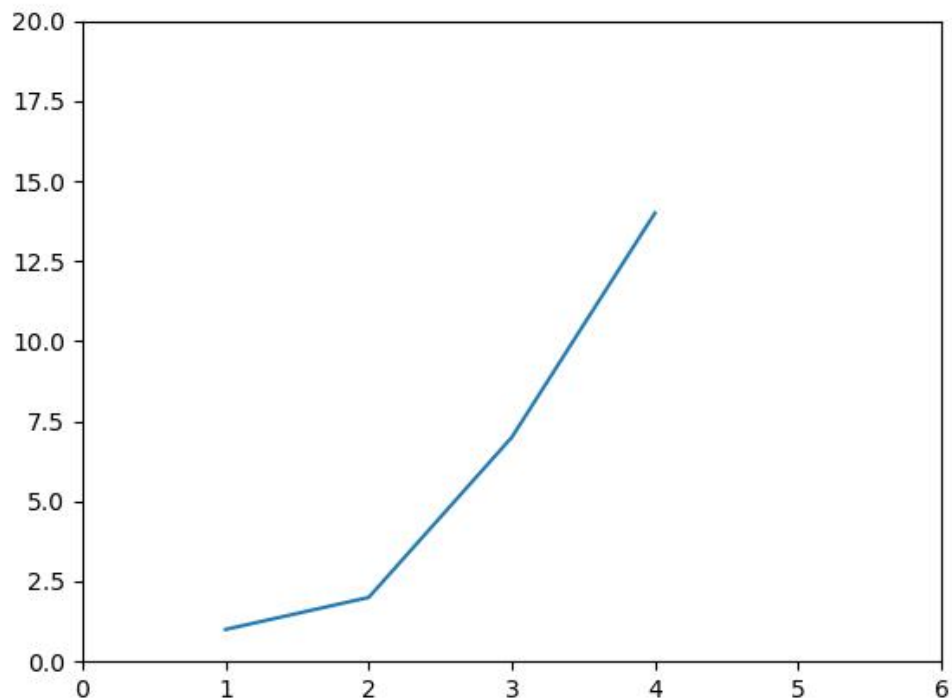
```
In [65]: np.linalg.norm(v)
```

```

Out[65]: 7.14142842854285
In [68]: m=np.array([[1,2,3,4],[5,6,7,8],[9,8,7,6],[5,4,3,2]])
In [72]: import scipy.linalg as linalg
In [73]: linalg.inv(m)
Out[73]:
array([[ -1.23848990e+16,   1.01330992e+16, -6.75539944e+15,
         4.50359963e+15],
       [ 1.41863388e+17, -1.01330992e+17,   4.05323966e+16,
        -2.00000000e+00],
       [-2.46572080e+17,   1.72262686e+17, -6.07985950e+16,
        -1.35107989e+16],
       [ 1.17093590e+17, -8.10647933e+16,   2.70215978e+16,
         9.00719925e+15]])
In [74]: linalg.pinv(m)
Out[74]:
array([[ -0.07241379, -0.06896552,   0.08103448,   0.07758621],
       [-0.01982759, -0.01293103,   0.03706897,   0.03017241],
       [ 0.03275862,   0.04310345, -0.00689655, -0.01724138],
       [ 0.08534483,   0.09913793, -0.05086207, -0.06465517]])

```

Task3:



Task4:

```
import matplotlib.pyplot as plt

import numpy as np

x = np.linspace(0, 10, 20)

y = np.sin(x)

plt.xlabel("x")

plt.ylabel("y")

xticks = np.linspace(0, 10, 11)

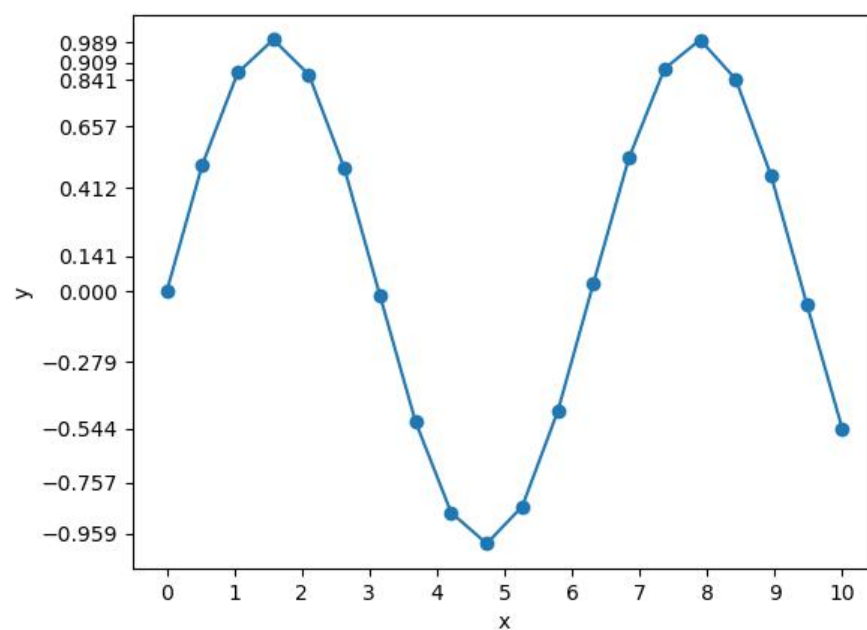
yticks = np.sin(xticks)

plt.xticks(xticks)

plt.yticks(yticks)

plt.plot(x, y, linestyle="-", marker="o", label="line")

plt.show()
```



Task5:

GITHUB:RuiqiKuang

Task6:

<https://github.com/RuiqiKuang/RiceCOMP576Assignment.git>