```
1 import numpy as np
2 arr4=np.random.randint(0,100,(2,5,5))
3 arr4
    array([[[34, 87, 1, 38, 53],
            [68, 65, 20, 89, 90],
            [ 9, 29, 78, 15, 72],
            [51, 44, 36, 83, 1],
            [12, 20, 18, 54, 40]],
           [[ 7, 94, 23, 53, 25],
            [58, 68, 79, 68, 56],
            [50, 47, 88, 77, 16],
            [42, 18, 28, 9, 99],
            [ 9, 94, 32, 93, 49]]])
1 arr5=arr4
2 arr5[0,0,1]=1997
3 arr5
    array([[[
               34, 1997,
                                   38,
                                         53],
                             1,
                            20,
               68,
                      65,
                                   89,
                                         90],
            [
            9,
                      29,
                             78,
                                   15,
                                         72],
            44,
                             36,
                                   83,
                                          1],
               51,
            [
               12,
                      20,
                            18,
                                   54,
                                         40]],
           [[
                7,
                      94,
                            23,
                                   53,
                                         25],
            [
               58,
                      68,
                            79,
                                   68,
                                         56],
            [
               50,
                      47,
                            88,
                                   77,
                                         16],
            42,
                      18,
                             28,
                                    9,
                                         99],
            94,
                             32,
                                   93,
                                         49]]])
                9,
Saved successfully!
                                 X
2 arr5
    array([[[ 34, 1997,
                             1,
                                   38,
                                         53],
                      65, 1976,
               68,
                                   89,
                                         90],
            9,
                      29,
                                   15,
                                         72],
                            78,
                      44,
                            36,
            [
               51,
                                   83,
                                          1],
            Γ
               12,
                            18,
                                   54,
                      20,
                                         40]],
           [[
                7,
                      94,
                             23,
                                   53,
                                         25],
                            79,
            58,
                      68,
                                   68,
                                         56],
            50,
                      47,
                            88,
                                   77,
                                         16],
               42,
            18,
                             28,
                                   9,
                                         99],
            Γ
                      94,
                             32,
                                   93,
                                         49]]])
                9,
1 arr4 # note = updates original array also update
    array([[[
               34, 1997,
                             1,
                                   38,
                                         53],
                      65, 1976,
               68,
                                   89,
                                         90],
            [
                      29,
                            78,
                                   15,
                                         72],
                9,
            51,
                      44,
                             36,
                                   83,
                                          1],
            12,
                      20,
                            18,
                                   54,
                                         40]],
```

7,

94,

23,

53,

25],

```
[
                58,
                      68,
                             79,
                                   68,
                                          56],
                                   77,
            [
                      47,
                             88,
                50,
                                          16],
                                   9,
                                          99],
            [
                             28,
                42,
                      18,
             [
                      94,
                             32,
                                   93,
                                         49]]])
                 9,
1 arr6=np.copy(arr4)
2 arr6
                                   38,
                                          53],
    array([[[ 34, 1997,
                              1,
            [
                68,
                      65, 1976,
                                   89,
                                          90],
            Γ
                      29,
                                   15,
                                          72],
                 9,
                             78,
             51,
                      44,
                             36,
                                   83,
                                          1],
             12,
                      20,
                             18,
                                   54,
                                          40]],
            [[
                7,
                      94,
                             23,
                                   53,
                                          25],
                      68,
                             79,
                                   68,
            [
                58,
                                          56],
            [
                50,
                      47,
                             88,
                                   77,
                                          16],
                                          99],
                      18,
                             28,
                                   9,
             42,
                      94,
                             32,
                                   93,
                                          49]]])
                 9,
1 \operatorname{arr6}[0,0,0] = 1961
2 arr6
    array([[[1961, 1997,
                              1,
                                   38,
                                          53],
                                   89,
                68,
                      65, 1976,
                                          90],
            9,
                      29,
                             78,
                                   15,
                                          72],
             51,
                      44,
                             36,
                                   83,
                                          1],
            [
                             18,
                12,
                      20,
                                   54,
                                          40]],
            []
                 7,
                      94,
                             23,
                                   53,
                                          25],
                      68,
                             79,
                                   68,
                                          56],
                58,
                                          16],
                                          99],
Saved successfully!
                                  X
                                          49]]])
1 arr4 #note arr4 not changes
                                   38,
                                          53],
    array([[[
                34, 1997,
                              1,
                      65, 1976,
                                   89,
                                          90],
            68,
                      29,
             78,
                                   15,
                                          72],
                 9,
             51,
                      44,
                             36,
                                   83,
                                          1],
             12,
                      20,
                             18,
                                   54,
                                          40]],
            [[
                7,
                      94,
                             23,
                                   53,
                                          25],
                             79,
                58,
                      68,
                                   68,
                                          56],
            [
            [
                50,
                      47,
                             88,
                                   77,
                                          16],
                             28,
             42,
                      18,
                                   9,
                                          99],
                                          49]]])
                 9,
                      94,
                             32,
                                   93,
1 t1=(0,1,4)
2 print(t1,type(t1))
3 arr6[t1]
    (0, 1, 4) <class 'tuple'>
```

90

```
1 11=[0,1,0]
2 12=[[1],[2],[3]]
3 print(arr6[11])
    [[[1961 1997
                    1
                         38
                              53]
                              901
         68
              65 1976
                         89
      9
              29
                   78
                         15
                              72]
         51
              44
      36
                         83
                              1]
      12
              20
                   18
                         54
                              40]]
     7
              94
                   23
                         53
                              25]
         58
              68
                   79
                         68
                              56]
         50
              47
                   88
                         77
      16]
         42
              18
                   28
                         9
                              99]
      9
              94
                   32
                         93
                              49]]
     [[1961 1997
                    1
                         38
                              53]
         68
              65 1976
                         89
                              90]
          9
              29
                        15
      78
                              72]
      51
              44
                   36
                         83
                              1]
      12
              20
                         54
                              40]]]
                   18
1 print(arr6[12])
    [77]
   /usr/local/lib/python3.7/dist-packages/ipykernel_launcher.py:1: FutureWarning: Using
      """Entry point for launching an IPython kernel.
1 \text{ ones} = \text{np.ones}((3,3))
Saved successfully!
    [[1. 1. 1.]
     [1. 1. 1.]
     [1. 1. 1.]]
    [[3. 3. 3.]
     [3. 3. 3.]
     [3. 3. 3.]]
1 sum = ones+double #similarly -
2 sum
   array([[4., 4., 4.],
           [4., 4., 4.],
           [4., 4., 4.]])
1 sum = ones*double #similarly /
2 sum
   array([[3., 3., 3.],
           [3., 3., 3.],
```

```
4/6/22, 1:22 PM
                                               0604clsnumpy.ipynb - Colaboratory
                [3., 3., 3.]])
     1 \exp = np.exp(sum)
     2 exp
         array([[20.08553692, 20.08553692, 20.08553692],
                 [20.08553692, 20.08553692, 20.08553692],
                [20.08553692, 20.08553692, 20.08553692]])
     1 sinsum = np.sin(sum)
     2 sinsum
         array([[0.14112001, 0.14112001, 0.14112001],
                [0.14112001, 0.14112001, 0.14112001],
                 [0.14112001, 0.14112001, 0.14112001]])
     1 \text{ sum} = \text{sum} + 100
     2 sum
         array([[103., 103., 103.],
                [103., 103., 103.],
                [103., 103., 103.]])
     1 #broadcasting
     2 a1=np.array([1,2,3,4,5])
     3 a2=np.array([9,9])
     4 a1+a2
                                                      Traceback (most recent call last)
         ValueError
                             <u>39432h302aa5></u> in <module>()
                                      X
     Saved successfully!
         ValueError: operands could not be broadcast together with shapes (5,) (2,)
          SEARCH STACK OVERFLOW
     1 a1=np.array([[1,2,3,4,5],[1,2,3,4,5],[1,2,3,4,5]])
     2 a2=np.array([9,9,9,9,9])
     3 a1+a2
         array([[10, 11, 12, 13, 14],
                [10, 11, 12, 13, 14],
                [10, 11, 12, 13, 14]])
     1 a1=np.array([[1,2,3,4,5],[1,2,3,4,5],[1,2,3,4,5]])
```

2 a2=np.array([9,9,9,9,9]+[9,9,9,9,9])

3 a1+a2

```
TypeError
                                              Traceback (most recent call last)
   <ipython-input-42-4c1659d5ccc8> in <module>()
          1 a1=np.array([[1,2,3,4,5],[1,2,3,4,5],[1,2,3,4,5]])
    ---> 2 a2=np.array([9,9,9,9,9]+0)
          3 a1+a2
   TypeError: can only concatenate list (not "int") to list
1 a1=np.array([[1,2,3,4,5],[1,2,3,4,5]])
2 a2=np.array([9,9])
3 a1+a2
   ValueError
                                              Traceback (most recent call last)
   <ipython-input-43-c15d830cc24c> in <module>()
          1 a1=np.array([[1,2,3,4,5],[1,2,3,4,5]])
          2 a2=np.array([9,9])
   ----> 3 a1+a2
   ValueError: operands could not be broadcast together with shapes (2,5) (2,)
     SEARCH STACK OVERFLOW
1 a1=np.array([[1,2,3,4,5],[1,2,3,4,5]])
2 a2=np.array([1]) # it treats like[[1,1,1,1,1],[1,1,1,1]]
3 a1+a2
   array([[2, 3, 4, 5, 6],
           [2, 3, 4, 5, 6]])
Saved successfully!
                                   ats like[[1,1,1,1,1],[1,1,1,1,1]]
3 a1+a2
4 # in all possible atleast one dimension match , or if each dimension 000
   array([ 2, 4, 6, 8, 10])
1 a1=np.arange(4)
2 a1
   array([0, 1, 2, 3])
   a2=np.reshape(a2,4)
1
2
   array([0, 1, 2, 3])
1
   arr1=np.array([[1,2,3],[4,5,6],[7,8,9]])
2
   arr2=np.array([1,2,3])
3
   #022
4
   #002
5
   print(arr1,arr2)
```

```
arr3=arr1+arr2
7
   print(arr3)
```

```
[[1 2 3]
[4 5 6]
[7 8 9]] [1 2 3]
[[ 2 4 6]
[579]
[ 8 10 12]]
```

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×