

21BCE9652,ASSIGNMENT-1

September 5, 2023

1 NumPy Exercises

Now that we've learned about NumPy let's test your knowledge. We'll start off with a few simple tasks, and then you'll be asked some more complicated questions.

Import NumPy as np

```
[ ]: import numpy as np
```

Create an array of 10 zeros

```
[ ]: z=np.zeros(10)
z
```

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

Create an array of 10 ones

```
[ ]: z=np.ones(10)
z
```

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

Create an array of 10 fives

```
[ ]: z=np.ones(10)*5
z
```

```
[ ]: array([5., 5., 5., 5., 5., 5., 5., 5., 5., 5.])
```

Create an array of the integers from 10 to 50

```
[ ]: z=np.arange(10,51,1)
z
```

```
[ ]: array([10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26,
          27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43,
          44, 45, 46, 47, 48, 49, 50])
```

Create an array of all the even integers from 10 to 50

```
[ ]: z=np.arange(10,51,2)
z
```

```
[ ]: array([10, 12, 14, 16, 18, 20, 22, 24, 26, 28, 30, 32, 34, 36, 38, 40, 42,
          44, 46, 48, 50])
```

Create a 3x3 matrix with values ranging from 0 to 8

```
[ ]: z=np.arange(0,9,1).reshape(3,3)
z
```

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

Create a 3x3 identity matrix

```
[ ]: z=np.eye(3)
z
```

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

Use NumPy to generate a random number between 0 and 1

```
[ ]: np.random.rand()
```

```
[ ]: 0.03453400146597918
```

```
[ ]: np.random.rand(0,1,2)
```

```
[ ]: array([], shape=(0, 1, 2), dtype=float64)
```

Use NumPy to generate an array of 25 random numbers sampled from a standard normal distribution

```
[ ]: np.random.rand(1,25)
```

```
[ ]: array([[0.66684619, 0.37646827, 0.01822226, 0.12782866, 0.08837738,
          0.64033627, 0.44283033, 0.08772187, 0.39386686, 0.14367275,
          0.27886931, 0.29224089, 0.85311451, 0.29853718, 0.70834955,
          0.67030692, 0.67068616, 0.44925624, 0.07258796, 0.31876261,
          0.05409184, 0.66132822, 0.62951505, 0.01769635, 0.41394928]])
```

Create the following matrix:

```
[ ]: np.arange(0.01,1.01,0.01).reshape(10,10)
```

```
[ ]: array([[0.01, 0.02, 0.03, 0.04, 0.05, 0.06, 0.07, 0.08, 0.09, 0.1 ],
          [0.11, 0.12, 0.13, 0.14, 0.15, 0.16, 0.17, 0.18, 0.19, 0.2 ]],
```

```
[0.21, 0.22, 0.23, 0.24, 0.25, 0.26, 0.27, 0.28, 0.29, 0.3 ],
[0.31, 0.32, 0.33, 0.34, 0.35, 0.36, 0.37, 0.38, 0.39, 0.4 ],
[0.41, 0.42, 0.43, 0.44, 0.45, 0.46, 0.47, 0.48, 0.49, 0.5 ],
[0.51, 0.52, 0.53, 0.54, 0.55, 0.56, 0.57, 0.58, 0.59, 0.6 ],
[0.61, 0.62, 0.63, 0.64, 0.65, 0.66, 0.67, 0.68, 0.69, 0.7 ],
[0.71, 0.72, 0.73, 0.74, 0.75, 0.76, 0.77, 0.78, 0.79, 0.8 ],
[0.81, 0.82, 0.83, 0.84, 0.85, 0.86, 0.87, 0.88, 0.89, 0.9 ],
[0.91, 0.92, 0.93, 0.94, 0.95, 0.96, 0.97, 0.98, 0.99, 1.  ]])
```

Create an array of 20 linearly spaced points between 0 and 1:

```
[ ]: np.linspace(0,1,20)
```

```
[ ]: array([0.          , 0.05263158, 0.10526316, 0.15789474, 0.21052632,
0.26315789, 0.31578947, 0.36842105, 0.42105263, 0.47368421,
0.52631579, 0.57894737, 0.63157895, 0.68421053, 0.73684211,
0.78947368, 0.84210526, 0.89473684, 0.94736842, 1.          ])
```

1.1 Numpy Indexing and Selection

Now you will be given a few matrices, and be asked to replicate the resulting matrix outputs:

```
[ ]: mat = np.arange(1,26).reshape(5,5)
mat
```

```
[ ]: 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]])
```

```
[ ]: # WRITE CODE HERE THAT REPRODUCES THE OUTPUT OF THE CELL BELOW
# BE CAREFUL NOT TO RUN THE CELL BELOW, OTHERWISE YOU WON'T
# BE ABLE TO SEE THE OUTPUT ANY MORE
```

```
[ ]: mat[2:5,1:5]
```

```
[ ]: array([[12, 13, 14, 15],
[17, 18, 19, 20],
[22, 23, 24, 25]])
```

```
[ ]: # WRITE CODE HERE THAT REPRODUCES THE OUTPUT OF THE CELL BELOW
# BE CAREFUL NOT TO RUN THE CELL BELOW, OTHERWISE YOU WON'T
# BE ABLE TO SEE THE OUTPUT ANY MORE
```

```
[ ]: mat[3:4,4:5]
```

```
[ ]: array([[20]])
```

```
[ ]: # WRITE CODE HERE THAT REPRODUCES THE OUTPUT OF THE CELL BELOW  
# BE CAREFUL NOT TO RUN THE CELL BELOW, OTHERWISE YOU WON'T  
# BE ABLE TO SEE THE OUTPUT ANY MORE
```

```
[ ]: mat[0:3,1:2]
```

```
[ ]: array([[ 2],  
          [ 7],  
          [12]])
```

```
[ ]: # WRITE CODE HERE THAT REPRODUCES THE OUTPUT OF THE CELL BELOW  
# BE CAREFUL NOT TO RUN THE CELL BELOW, OTHERWISE YOU WON'T  
# BE ABLE TO SEE THE OUTPUT ANY MORE
```

```
[ ]: mat[4:5,0::]
```

```
[ ]: array([[21, 22, 23, 24, 25]])
```

```
[ ]: # WRITE CODE HERE THAT REPRODUCES THE OUTPUT OF THE CELL BELOW  
# BE CAREFUL NOT TO RUN THE CELL BELOW, OTHERWISE YOU WON'T  
# BE ABLE TO SEE THE OUTPUT ANY MORE
```

```
[ ]: mat[3::,0::]
```

```
[ ]: array([[16, 17, 18, 19, 20],  
          [21, 22, 23, 24, 25]])
```

1.1.1 Now do the following

Get the sum of all the values in mat

```
[ ]: mat.sum()
```

```
[ ]: 325
```

Get the standard deviation of the values in mat

```
[ ]: mat.std()
```

```
[ ]: 7.211102550927978
```

Get the sum of all the columns in mat

```
[ ]: np.sum(mat,axis=0)
```

```
[ ]: array([55, 60, 65, 70, 75])
```