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

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```
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(10,50)
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])
```

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

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

Create a 3x3 identity matrix

```
z=np.identity(3)
z
```

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

- Use NumPy to generate a random number between 0 and 1

```
z=np.random.normal(0,1,1)
z
```

```
array([0.86415611])
```

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

```
z=np.random.normal(0,1,25)
z
```

```
array([-0.18672635,  0.26060474,  1.34571634,  0.04005998, -0.24856177,
        0.08432354,  3.48731851,  1.95395664,  1.84832593,  0.30020633,
        0.51153997,  0.6163852 , -1.44489725,  0.70426024, -0.642819  ,
        0.32332963,  1.86842398, -0.48867309, -0.09854398, -0.97910576,
        0.96356715, -1.20071939, -0.7271288 ,  0.42584526,  0.79273485])
```

- Create the following matrix:

```
z=np.linspace(0,1,100)
z
```

```
array([0.        , 0.01010101, 0.02020202, 0.03030303, 0.04040404,
       0.05050505, 0.06060606, 0.07070707, 0.08080808, 0.09090909,
       0.1010101 , 0.11111111, 0.12121212, 0.13131313, 0.14141414,
       0.15151515, 0.16161616, 0.17171717, 0.18181818, 0.19191919,
       0.2020202 , 0.21212121, 0.22222222, 0.23232323, 0.24242424,
       0.25252525, 0.26262626, 0.27272727, 0.28282828, 0.29292929,
       0.3030303 , 0.31313131, 0.32323232, 0.33333333, 0.34343434,
       0.35353535, 0.36363636, 0.37373737, 0.38383838, 0.39393939,
       0.4040404 , 0.41414141, 0.42424242, 0.43434343, 0.44444444,
       0.45454545, 0.46464646, 0.47474747, 0.48484848, 0.49494949,
       0.50505051, 0.51515152, 0.52525253, 0.53535354, 0.54545455,
       0.55555556, 0.56565657, 0.57575758, 0.58585859, 0.5959596 ,
       0.60606061, 0.61616162, 0.62626263, 0.63636364, 0.64646465,
       0.65656566, 0.66666667, 0.67676768, 0.68686869, 0.6969697 ,
       0.70707071, 0.71717172, 0.72727273, 0.73737374, 0.74747475,
       0.75757576, 0.76767677, 0.77777778, 0.78787879, 0.7979798 ,
       0.80808081, 0.81818182, 0.82828283, 0.83838384, 0.84848485,
       0.85858586, 0.86868687, 0.87878788, 0.88888889, 0.8989899 ,
       0.90909091, 0.91919192, 0.92929293, 0.93939394, 0.94949495,
       0.95959596, 0.96969697, 0.97979798, 0.98989899, 1.        ])
```

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

```
z=np.linspace(0,1,20)
z
```

```
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.        ])
```

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]])
```

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

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

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

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

```
mat[3,4]
```

```
20
```

```
20
```

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

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

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

```
mat[4]
```

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

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

```
mat[3:]
```

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

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

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

```
mat.sum(axis=1)
```

```
array([ 15,  40,  65,  90, 115])
```

Double-click (or enter) to edit

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