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

In [1]:
```
import numpy as np
```

Create an array of 10 zeros

In [2]:
```
a = np.zeros(10)
print(a)
```

```
[0. 0. 0. 0. 0. 0. 0. 0. 0. 0.]
```

Create an array of 10 ones

In [3]:
```
arr = np.ones((1,10))
print(arr)
```

```
[[1. 1. 1. 1. 1. 1. 1. 1. 1. 1.]]
```

Create an array of 10 fives

In [4]:
```
arr = np.ones((1,10)) * 5
print(arr)
```

```
[[5. 5. 5. 5. 5. 5. 5. 5. 5. 5.]]
```

Create an array of the integers from 10 to 50

In [5]:
```
arr = np.arange(10,51)
print(arr)
```

```
[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

In [6]:
```
arr = np.arange(10,51,2)
print(arr)
```

```
[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

In [23]:
```
arr = np.arange(0,9)
narr = arr.reshape(3,3)
print(narr)
```

```
[[0 1 2]
 [3 4 5]
 [6 7 8]]
```

Create a 3x3 identity matrix

In [25]:
```
arr = np.identity(3)
print(arr)
```

```
[[1. 0. 0.]
 [0. 1. 0.]
 [0. 0. 1.]]
```

Use NumPy to generate a random number between 0 and 1

In [35]:
```
a = np.random.normal(0,1,1)
print(a)
```

```
[0.65404208]
```

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

In [36]:
```
arr = np.random.randn(25)
print(arr)
```

```
[ 0.43738413  0.28868598 -1.5940056   0.73081918  0.85660745  0.76003359
 -0.4255648  -1.92302496  0.37909671  0.40199021  0.5429882  -1.01218148
 -1.87783485 -0.58986757  0.70942627 -1.02555293  1.30727276  0.81076616
  0.40837894  0.37114785 -0.83514596  0.50018331 -0.62985999 -2.55455285
  1.08943831]
```

Create the following matrix:

In [11]:
```
arr = np.arange(0.01,1.01,0.01)
narr = np.reshape(arr,(10,10))
print(narr)
```

```
[[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:

In [12]:
```
arr = np.linspace(0,1,20)
print(arr)
```

```
[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:

In [13]:
```
mat = np.arange(1,26).reshape(5,5)
mat
```

Out[13]:
```
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]])
```

In [14]:
```
mat[2:,1:]
```

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

In [15]:
```
mat[3,4]
```

Out[15]:
```
20
```

In [16]:
```
mat[0:3,1:2]
```

Out[16]:
```
array([[ 2],
       [ 7],
       [12]])
```

In [17]:
```
mat[0:3,1:2]
```

Out[17]:
```
array([[ 2],
       [ 7],
       [12]])
```

In [18]:
```
mat[4:,0:]
```

Out[18]:
```
array([[21, 22, 23, 24, 25]])
```

In [19]:
```
mat[3:,0:]
```

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

Now do the following

Get the sum of all the values in mat

In [20]:
```
mat.sum()
```

Out[20]:
```
325
```

Get the standard deviation of the values in mat

In [21]:
```
mat.std()
```

Out[21]:
```
7.211102550927978
```

Get the sum of all the columns in mat

In [22]:
```
mat.sum(axis=0)
```

Out[22]:
```
array([55, 60, 65, 70, 75])
```

Great Job!