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 [6]:  np.zeros(10)
```

```
Out[6]:  array([0., 0., 0., 0., 0., 0., 0., 0., 0., 0.])
```

Create an array of 10 ones

```
In [3]:  np.ones(10)
```

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

Create an array of 10 fives

```
In [63]:  np.ones(10)*5
```

```
Out[63]:  array([5., 5., 5., 5., 5., 5., 5., 5., 5., 5.])
```

Create an array of the integers from 10 to 50

```
In [23]:  l=[]
          for i in range (10,51):
                  l.append(i)
          np.array(l)
```

```
Out[23]:  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

```
In [22]:  a=[]
          for i in x:
              if i%2==0:
                  a.append(i)
          np.array(a)
```

```
Out[22]:  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

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

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

Create a 3x3 identity matrix

```
In [8]:  np.eye(3)
```

```
Out[8]:  array([[1., 0., 0.],
                [0., 1., 0.],
                [0., 0., 1.]])
```

Use NumPy to generate a random number between 0 and 1

```
In [24]:  np.random.rand(1,1)
```

```
Out[24]:  array([[0.22156466]])
```

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

```
In [28]:  np.random.normal(0,1,25)
```

```
Out[28]:  array([-0.94860032, -0.99736776,  0.79595476, -0.30620517,  0.22455232,
                 -1.24788246,  1.52645815, -0.51916142,  1.00182983, -0.7676737 ,
                 -0.80074462,  0.4451378 ,  0.27327433,  1.75295064, -1.05393296,
                 -0.75230325,  0.94951252,  0.61770577,  1.10561823, -0.52702081,
                 -1.18895596, -0.12257477,  0.60078492, -0.98230229,  0.2360105 ])
```

Create the following matrix:

```
In [68]:  np.arange(0.01,1.01,0.01).reshape(10,10)
```

```
Out[68]:  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:

```
In [58]:  np.linspace(0,1,20)
```

```
Out[58]:  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:

```
In [32]:  mat = np.arange(1,26).reshape(5,5)
          mat
```

```
Out[32]:  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 [0]:  # 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
```

```
In [37]:  mat[2:5,1:5]
```

```
Out[37]:  array([[12, 13, 14, 15],
                 [17, 18, 19, 20],
                 [22, 23, 24, 25]])
```

```
In [0]:  # 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
```

```
In [40]:  mat[3,4]
```

```
Out[40]:  20
```

```
In [0]:  # 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
```

```
In [46]:  y=mat[0:3,1]
          y.reshape(3,1)
```

```
Out[46]:  array([[ 2],
                 [ 7],
                 [12]])
```

```
In [0]:  # 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
```

```
In [48]:  mat[4,0:5]
```

```
Out[48]:  array([21, 22, 23, 24, 25])
```

```
In [0]:  # 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
```

```
In [50]:  mat[3:5,0:5]
```

```
Out[50]:  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 [51]:  mat.sum()
```

```
Out[51]:  325
```

Get the standard deviation of the values in mat

```
In [55]:  mat.std()
```

```
Out[55]:  7.211102550927978
```

Get the sum of all the columns in mat

```
In [57]:  mat.sum(axis=0)
```

```
Out[57]:  array([55, 60, 65, 70, 75])
```