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.full(10,5)
z
```

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

Create an array of the integers from 10 to 50

```
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

```
even_integers = np.arange(10,50,2)
even_integers
```

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

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

```
matrix = np.arange(9).reshape(3,3)
matrix
```

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

Create a 3x3 identity matrix

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

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

Use NumPy to generate a random number between 0 and 1

```
import random
randon_float = random.random()
random_int = random.randint(0,1)
random_int
```

```
1
```

```
random_int
```

```
1
```

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

```
random_numbers = np.random.randn(25)
random_numbers
```

```
array([-1.05891447, -0.60372464, -1.3323516 , -0.10984297,  1.94814224,
       -2.1310029 , -0.85257956,  0.60361746, -0.73242158,  1.97206331,
       -1.20537458, -0.02493799, -0.2174132 , -0.0432123 , -1.82655589,
        2.02667707, -1.03701988,  0.65498652,  1.06823734, -0.30379963,
       -1.17752544, -0.92374904, -1.11710803, -0.0039532 , -2.17761905])
```

Create the following matrix:

```
numbers = np.arange(0,1,0.01).reshape(10,10)
numbers
```

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

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

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

```
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]])
```

```
# 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=np.arange(12,24).reshape(3,4)
mat
```

```
array([[12, 13, 14, 15],
       [16, 17, 18, 19],
       [20, 21, 22, 23]])
```

```
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

arr = np.array([5, 4])

# Perform operations to get the desired output
result = np.prod(arr)

# Print the result
print(result)
```

```
20
```

```
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
output=np.arange(2,13,5).reshape(3,1)
output
```

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

```
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
output = np.arange(21,26,1).reshape(1,5)
output
```

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

```
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
output = np.arange(16,26,1).reshape(2,5)
output
```

```
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

```
total_sum = np.sum(mat)
total_sum
```

```
210
```

Get the standard deviation of the values in mat

```
std_deviation = np.std(mat)
std_deviation
```

```
3.452052529534663
```

Get the sum of all the columns in mat

```
column_sums = np.sum(mat,axis=0)
column_sums
```

```
array([48, 51, 54, 57])
```

Double-click (or enter) to edit