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 [2]:

```
import numpy as np
```

Create an array of 10 zeros

In [3]:

```
zeros_array = np.zeros(10)

print(zeros_array)
```

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

Create an array of 10 ones

In [4]:

```
ones_array = np.ones(10)

print(ones_array)
```

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

Create an array of 10 fives

In [5]:

```
fives_array = np.ones(10) * 5

print(fives_array)
```

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

Create an array of the integers from 10 to 50

In [6]:

```
integers_array = np.arange(10, 51)

print(integers_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 [7]:

```
even_integers_array = np.arange(10, 51, 2)

print(even_integers_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 [8]:

```
values_array = np.arange(9)
matrix_3x3 = values_array.reshape(3, 3)
print(matrix_3x3)
```

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

Create a 3x3 identity matrix

In [9]:

```
identity_matrix = np.eye(3)

print(identity_matrix)
```

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

Use NumPy to generate a random number between 0 and 1

In [10]:

```
random_number = np.random.rand()

print(random_number)
```

```
0.8500901596976387
```

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

In [12]:

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

print(random_numbers)
```

```
[-1.24682034  0.41331688  0.72591612 -1.34289469 -0.63530032 -0.4425134
  0.71652609  0.069916    0.57112605  1.05757901 -0.44570484 -1.09043254
  0.55073058 -0.67404429 -0.26551824 -0.99283042 -1.39376753  0.19174472
 -0.07824627 -1.80486913 -0.57187895 -1.01314077  0.62667179 -0.37991694
  0.63183422]
```

Create the following matrix:

In [13]:

```
values_array = np.arange(0.01, 1.01, 0.01)

matrix_10x10 = values_array.reshape(10, 10)

print(matrix_10x10)
```

```
[[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 [14]:

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

print(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:

In [16]:

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

Out[16]:

```
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 [18]:

```
submatrix = mat[2:, 1:]
print(submatrix)
```

```
[[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 [19]:

```
value_20 = mat[3, 4]
print(value_20)
```

```
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 [20]:

```
submatrix = mat[0:3, 1:2]
print(submatrix)
```

```
[[ 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 [21]:

```
last_row = mat[4, :]
print(last_row)
```

```
[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 [22]:

```
last_two_rows = mat[3:5, :]
print(last_two_rows)
```

```
[[16 17 18 19 20]
 [21 22 23 24 25]]
```

Now do the following

Get the sum of all the values in mat

In [23]:

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

```
325
```

Get the standard deviation of the values in mat

In [24]:

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

```
7.211102550927978
```

Get the sum of all the columns in mat

In [25]:

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

print(column_sums)
```

```
[55 60 65 70 75]
```

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