1 Python for Numerical Analysis 101

1.1 Homework

1.1.1 Instructor: Evelyn J. Boettcher, DiDacTex, LLC

1.2 Week 2 Lesson 2

1.3 Problems

1.3.1 1

Write a script that * generates an array of numbers from 16-100,000 with a stride of 4. * reshape it to a 2083 rows by 12 columns * print out the first 3 and last 3 rows

1.3.2 2

Build an numpy array WITH named types

1.3.3 3

Build a numpy array of ones called "A" * take a slice out and call that slice by variable "B". * multiply B by 5 or a slice of B by 5 * print(A) * repeat above WITHOUT or WITH changing the value of "A"

1.3.4 4

Take the mode of the data in the last example

1.3.5 5

Read in a csv file but use dtype 'U5' for the header

1.4 Solution

1.4.1 1

```
import numpy as np
a = np.arange(16, 100_000, 4)
b = a.reshape(2083, 12)
print(b[:3, :])
print(b[-3:, :])
```

1.4.2 2

```
import numpy as np
bb = np.array([[3, 4, 6.78], [7.5, 3, 5]])
bb = bb.astype([('col1', 'float'), ('col2', 'int8'), ('col3', 'float32')])
print(bb['col3'])
```

```
print(bb[2,:]) # This doesn't work!
print(bb[:,2])
int8_type = bb['col2']
float32_type = bb['col3']
# ...
```

1.4.3 3

```
import numpy as np
A= np.ones([3, 5])
B = A
B[1:2, 1] = B[1:2, 1] * 5
print(A)  # Look A now has values = to 5


# Multi B by 5 WITHOUT affecting A
A= np.ones([3, 5])
B = A.copy()
B[1:2, 1] = B[1:2, 1] * 5
print(A)
```

1.4.4 4

Mode is not a numpy function. You can use scipy or pandas. Tomorrow we will discuss this more!

```
import numpy as np
import pandas as pd
A= np.ones(20)
A[1:5] = A[1:5] * 5
df_A = pd.DataFrame(A)
print(df_A.mode())

#or

A = np.random.rand(5)*10
df_A = pd.DataFrame(A)
print(df_A.mode())  ## Does not GIVE a single value !?!?!!?
```

1.4.5 5

Note the header is only 5 characters long

```
import numpy as np
help(np.genfromtxt)  # Let's see what this method can do!
filenm = '../../../data/ASPN----CUB_0--PAYLOAD_PIXHAWK--10020--ALTITUDE.csv'
headers = np.genfromtxt(filenm, delimiter=",", max_rows=1, dtype='U5')
data = np.genfromtxt('../../data/'+filenm, delimiter=',', skip_header=1, names=headers.tolist())
```