1. Include a section with your name   ¶

```
In [1]: print('My name is Zhicheng (Jason) Xue')
```

```
My name is Zhicheng (Jason) Xue
```

Import Numpy package

```
In [2]: import numpy as np
```

2. Create matrix A with size (3,5) containing random numbers A = np.random.random(15)

```
In [3]: A=np.matrix(np.random.random(15))
```

```
In [4]: A=A.reshape(3,5)
```

```
In [5]: A
```

```
Out[5]: matrix([[0.27312478, 0.1316681 , 0.73030061, 0.7036173 , 0.70908962],
                [0.42332438, 0.02496484, 0.62343015, 0.14405398, 0.82364207],
                [0.93523005, 0.83387994, 0.07663138, 0.57137957, 0.41623966]])
```

3. Find the size and length of matrix A

```
In [6]: A.size #size of matrix A
```

```
Out[6]: 15
```

```
In [7]: len(A) #length of matrix A using len() function in Python which returns number of rows in a matrix
```

```
Out[7]: 3
```

Comment: I looked up definition of length of matrix in Matlab (https://www.mathworks.com/help/matlab/ref/length.html (https://www.mathworks.com/help/matlab/ref/length.html))

length of a matrix should be length of largest array dimension so I also tried below

Length of Rectangular Matrix

Find the length of a 3-by-7 matrix of zeros.

```
X = zeros(3,7);
L = length(X)
```

L = 7

```
In [8]: np.max(A.shape)

Out[8]: 5
```

4. Resize (crop/slice) matrix A to size (3,4)

```
In [9]: A=A[:,:4]
```

```
In [10]: A

Out[10]: matrix([[0.27312478, 0.1316681 , 0.73030061, 0.7036173 ],
                  [0.42332438, 0.02496484, 0.62343015, 0.14405398],
                  [0.93523005, 0.83387994, 0.07663138, 0.57137957]])
```

5. Find the transpose of matrix A and assign it to B

```
In [11]: B=A.T
```

```
In [12]: B

Out[12]: matrix([[0.27312478, 0.42332438, 0.93523005],
                  [0.1316681 , 0.02496484, 0.83387994],
                  [0.73030061, 0.62343015, 0.07663138],
                  [0.7036173 , 0.14405398, 0.57137957]])
```

6. Find the minimum value in column 1 of matrix B (check the properties of a matrix – 'B.min()')

```
In [13]: B.min(0)[0,0]
```

```
Out[13]: 0.1316681029608754
```

7. Find the minimum and maximum values for the entire matrix A

minimum of A

```
In [14]: A.min()
```

```
Out[14]: 0.024964837605679024
```

maximum of A

```
In [15]: A.max()
```

```
Out[15]: 0.9352300517338399
```

8. Create vector X (an array) with 4 random numbers

```
In [16]: X=np.array(np.random.random(4))
```

```
In [17]: X
```

```
Out[17]: array([0.52684514, 0.01167519, 0.50269015, 0.03272097])
```

```
In [18]: X.shape
```

```
Out[18]: (4,)
```

```
In [19]: A.shape
```

```
Out[19]: (3, 4)
```

9. Create a function and pass vector X and matrix A in it

```
In [20]: def matmul_new(X,A):
             D=A.dot(X)
             return D
```

10. In the new function multiply vector X with matrix A and assign the result to D

(note: you may get an error! ... think why and fix it. Recall matric manipulation in class!)

```
In [21]: D=matmul_new(X,A)
```

```
In [22]: D
```
Out[22]: matrix([[0.53556967, 0.54142364, 0.55967504]])

11. Create a complex number Z with absolute and real parts != 0

```
In [23]: Z=3+4j
```

```
In [24]: type(Z)
```
Out[24]: complex

12. Show its real and imaginary parts as well as it's absolute value

real part

```
In [25]: Z.real
```
Out[25]: 3.0

imaginary part

```
In [26]: Z.imag
```
Out[26]: 4.0

absolute part

```
In [27]: np.absolute(Z)
```
Out[27]: 5.0

13. Multiply result D with the absolute value of Z and record it to C

```
In [28]: D.shape
```
Out[28]: (1, 3)

```
In [29]: C=D*np.absolute(Z)
```

```
In [30]: C
```
Out[30]: matrix([[2.67784837, 2.70711819, 2.79837522]])

14. Convert matrix B from a matrix to a string and overwrite B

```
In [31]: B
```
Out[31]: matrix([[0.27312478, 0.42332438, 0.93523005],
                 [0.1316681 , 0.02496484, 0.83387994],
                 [0.73030061, 0.62343015, 0.07663138],
                 [0.7036173 , 0.14405398, 0.57137957]])

```
In [32]: B=np.array_str(B)
```

```
In [33]: B
```
Out[33]: '[[0.27312478 0.42332438 0.93523005]\n [0.1316681 0.02496484 0.83387994]\n [0.730
         30061 0.62343015 0.07663138]\n [0.7036173 0.14405398 0.57137957]]'

15. Display a text on the screen: 'Your Name is done with HW2'

```
In [34]: print('Zhicheng Xue is done with HW2')
```
         Zhicheng Xue is done with HW2

16. Organize your code: use each line from this assignment as a comment line before each step

17. Save all steps as a script in a .py file

18. Email your Github link to me including your .py file + screenshots of your running code no later than midnight on Saturday Jun.09.