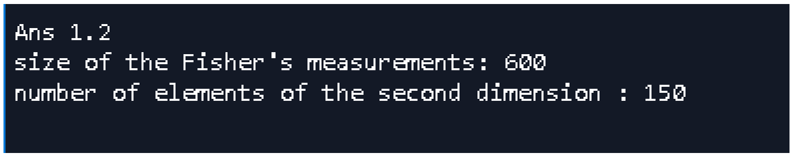
Solutions and Screenshots

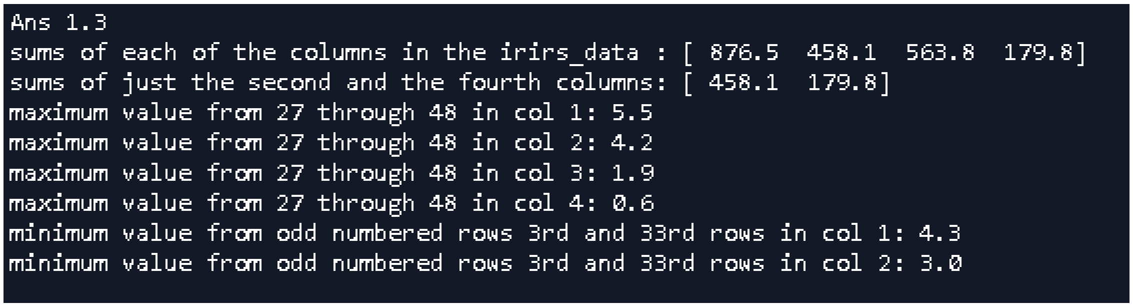
Q1.1 What is the difference between loadtxt and genfromtxt functions?
A1.1 genfromtxt has extra parameters like missing_values and filling_values to handle missing data when loading a file

Ans 1.2



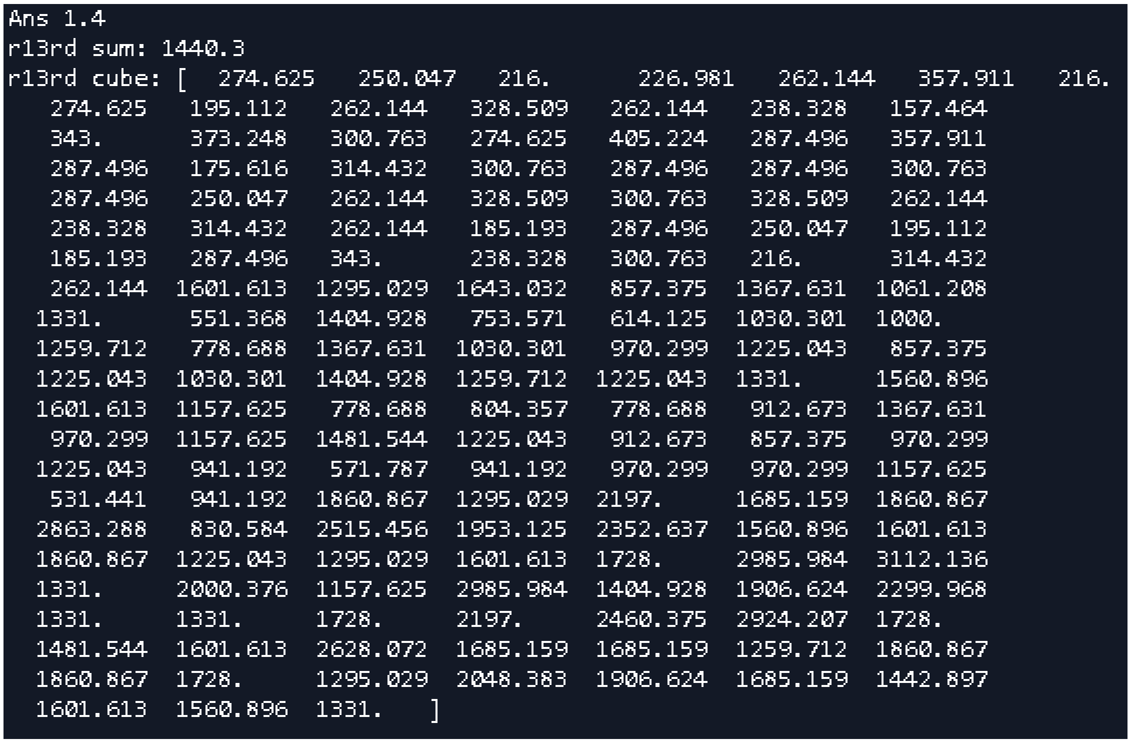
```
Ans 1.2
size of the Fisher's measurements: 600
number of elements of the second dimension : 150
```

Ans 1.3



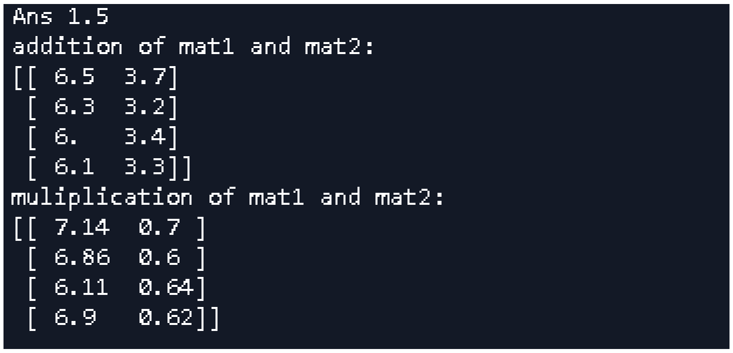
```
Ans 1.3
sums of each of the columns in the irirs_data : [ 876.5  458.1  563.8  179.8]
sums of just the second and the fourth columns: [ 458.1  179.8]
maximum value from 27 through 48 in col 1: 5.5
maximum value from 27 through 48 in col 2: 4.2
maximum value from 27 through 48 in col 3: 1.9
maximum value from 27 through 48 in col 4: 0.6
minimum value from odd numbered rows 3rd and 33rd rows in col 1: 4.3
minimum value from odd numbered rows 3rd and 33rd rows in col 2: 3.0
```

Ans 1.4



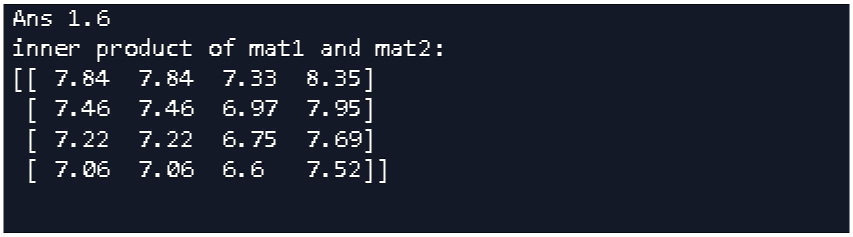
```
Ans 1.4
r13rd sum: 1440.3
r13rd cube: [  274.625   250.047   216.      226.981   262.144   357.911   216.
   274.625   195.112   262.144   328.509   262.144   238.328   157.464
   343.      373.248   300.763   274.625   405.224   287.496   357.911
   287.496   175.616   314.432   300.763   287.496   287.496   300.763
   287.496   250.047   262.144   328.509   300.763   328.509   262.144
   238.328   314.432   262.144   185.193   287.496   250.047   195.112
   185.193   287.496   343.      238.328   300.763   216.      314.432
   262.144  1601.613  1295.029  1643.032   857.375  1367.631  1061.208
  1331.      551.368  1404.928   753.571   614.125  1030.301  1000.
  1259.712   778.688  1367.631  1030.301   970.299  1225.043   857.375
  1225.043  1030.301  1404.928  1259.712  1225.043  1331.     1560.896
  1601.613  1157.625   778.688   804.357   778.688   912.673  1367.631
   970.299  1157.625  1481.544  1225.043   912.673   857.375   970.299
  1225.043   941.192   571.787   941.192   970.299   970.299  1157.625
   531.441   941.192  1860.867  1295.029  2197.     1685.159  1860.867
  2863.288   830.584  2515.456  1953.125  2352.637  1560.896  1601.613
  1860.867  1225.043  1295.029  1601.613  1728.     2985.984  3112.136
  1331.     2000.376  1157.625  2985.984  1404.928  1906.624  2299.968
  1331.     1331.     1728.     2197.     2460.375  2924.207  1728.
  1481.544  1601.613  2628.072  1685.159  1685.159  1259.712  1860.867
  1860.867  1728.     1295.029  2048.383  1906.624  1685.159  1442.897
  1601.613  1560.896  1331.    ]
```

Ans 1.5



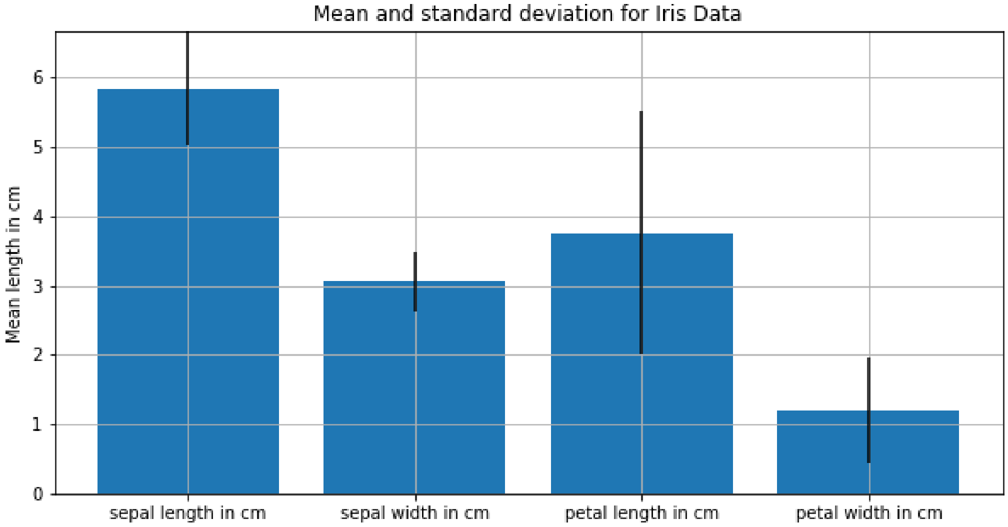
```
Ans 1.5
addition of mat1 and mat2:
[[ 6.5  3.7]
 [ 6.3  3.2]
 [ 6.   3.4]
 [ 6.1  3.3]]
muliplication of mat1 and mat2:
[[ 7.14  0.7 ]
 [ 6.86  0.6 ]
 [ 6.11  0.64]
 [ 6.9   0.62]]
```

Ans 1.6

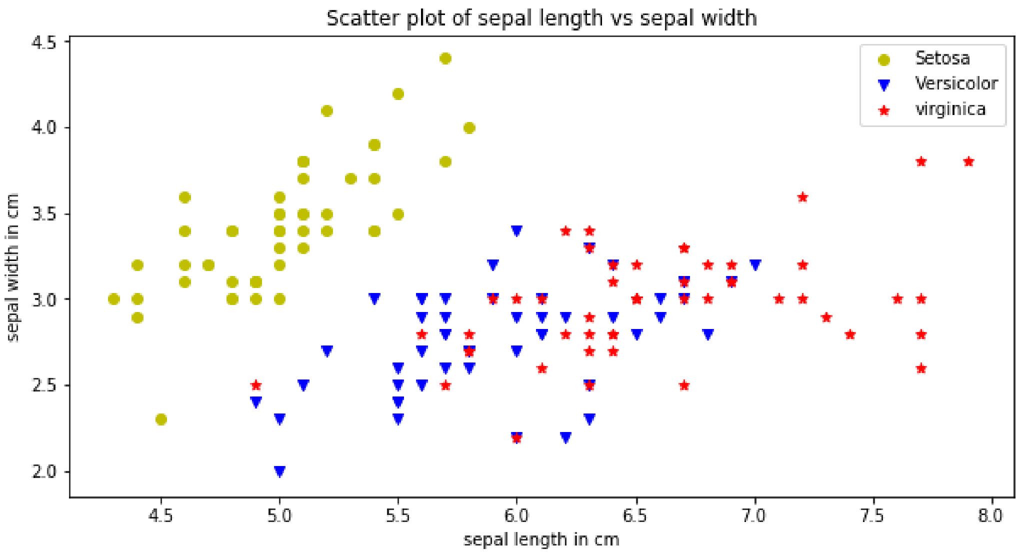


```
Ans 1.6
inner product of mat1 and mat2:
[[ 7.84  7.84  6.33  8.35]
 [ 7.46  7.46  6.97  7.95]
 [ 7.22  7.22  6.75  7.69]
 [ 7.06  7.06  6.6   7.52]]
```

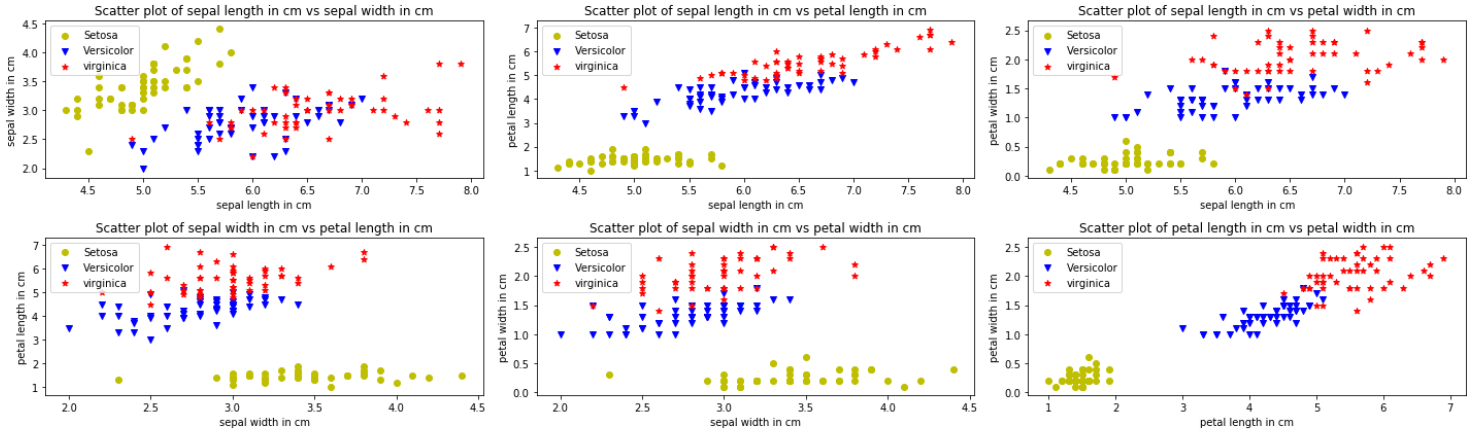
Ans 1.7



Ans 1.8



Ans 1.9



Ans 1.10

seed - It is used to re-seed the RandomState class.

RandomState - It is a class used to generate a random number which can either be a single a value or an array based on an argument 'size' that each of the method takes.

rand - Takes array shape as an argument and generate a random array between 0 (including) and 1 (excluding) e.g. np.random.rand(4,1). If no shape is provided a random floating point is generated.

randn - Instead of uniform distribution between [0,1) in rand, randn output is based on “standard normal” distribution.

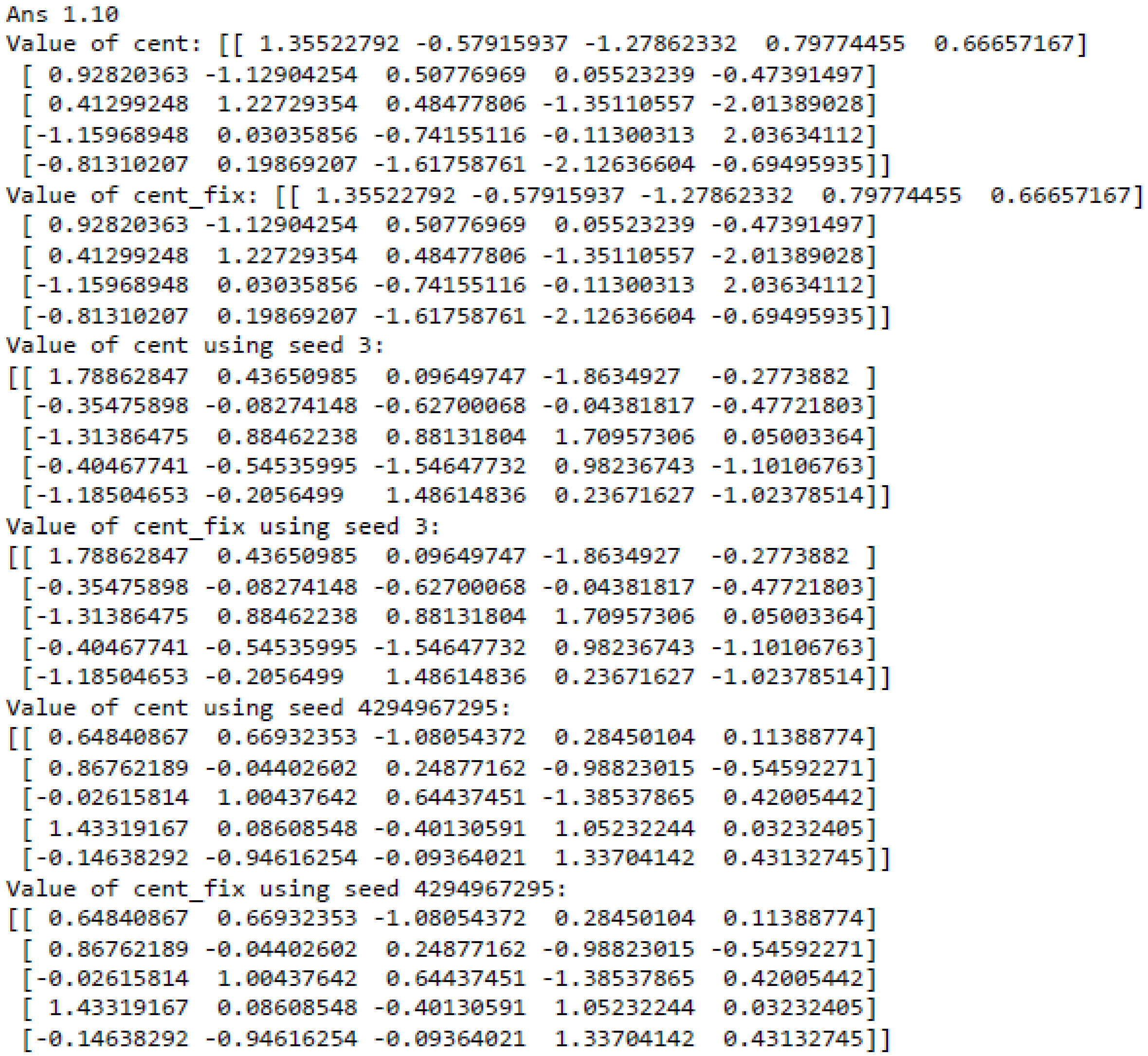
randint - randint output a random integer array based on the size and “discrete uniform” distribution of low and high integer values where [low,high). If no size is given it will output a random integer value.

Q why there are negative values in cent?

Ans. There are negative values because normal distribution is from negative infinity to positive infinity

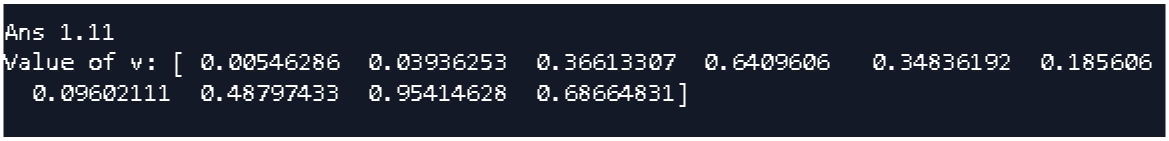
Q Explain a scenario that you must use RandomState before the random generator function

Ans. The instance of the RandomState is used to get the consistent random numbers.



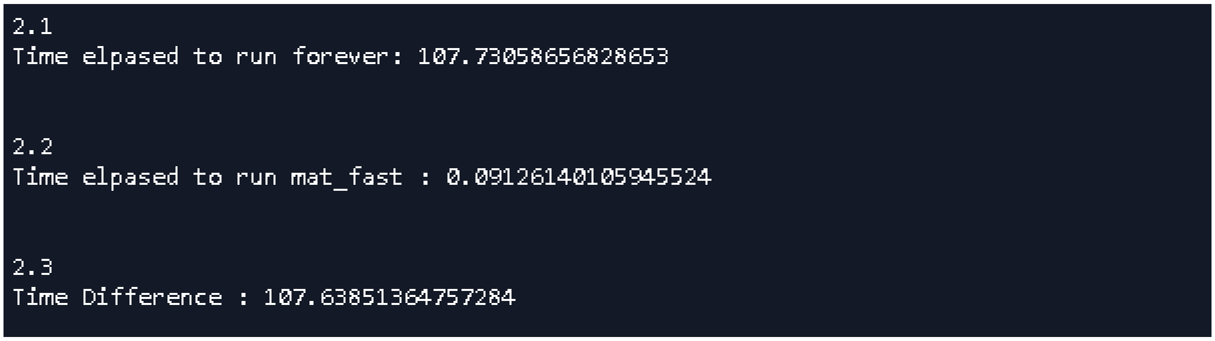
```
Ans 1.10
Value of cent: [[ 1.35522792 -0.57915937 -1.27862332  0.79774455  0.66657167]
 [ 0.92820363 -1.12904254  0.50776969  0.05523239 -0.47391497]
 [ 0.41299248  1.22729354  0.48477806 -1.35110557 -2.01389028]
 [-1.15968948  0.03035856 -0.74155116 -0.11300313  2.03634112]
 [-0.81310207  0.19869207 -1.61758761 -2.12636604 -0.69495935]]
Value of cent_fix: [[ 1.35522792 -0.57915937 -1.27862332  0.79774455  0.66657167]
 [ 0.92820363 -1.12904254  0.50776969  0.05523239 -0.47391497]
 [ 0.41299248  1.22729354  0.48477806 -1.35110557 -2.01389028]
 [-1.15968948  0.03035856 -0.74155116 -0.11300313  2.03634112]
 [-0.81310207  0.19869207 -1.61758761 -2.12636604 -0.69495935]]
Value of cent using seed 3:
[[ 1.78862847  0.43650985  0.09649747 -1.8634927  -0.2773882 ]
 [-0.35475898 -0.08274148 -0.62700068 -0.04381817 -0.47721803]
 [-1.31386475  0.88462238  0.88131804  1.70957306  0.05003364]
 [-0.40467741 -0.54535995 -1.54647732  0.98236743 -1.10106763]
 [-1.18504653 -0.2056499   1.48614836  0.23671627 -1.02378514]]
Value of cent_fix using seed 3:
[[ 1.78862847  0.43650985  0.09649747 -1.8634927  -0.2773882 ]
 [-0.35475898 -0.08274148 -0.62700068 -0.04381817 -0.47721803]
 [-1.31386475  0.88462238  0.88131804  1.70957306  0.05003364]
 [-0.40467741 -0.54535995 -1.54647732  0.98236743 -1.10106763]
 [-1.18504653 -0.2056499   1.48614836  0.23671627 -1.02378514]]
Value of cent using seed 4294967295:
[[ 0.64840867  0.66932353 -1.08054372  0.28450104  0.11388774]
 [ 0.86762189 -0.04402602  0.24877162 -0.98823015 -0.54592271]
 [-0.02615814  1.00437642  0.64437451 -1.38537865  0.42005442]
 [ 1.43319167  0.08608548 -0.40130591  1.05232244  0.03232405]
 [-0.14638292 -0.94616254 -0.09364021  1.33704142  0.43132745]]
Value of cent_fix using seed 4294967295:
[[ 0.64840867  0.66932353 -1.08054372  0.28450104  0.11388774]
 [ 0.86762189 -0.04402602  0.24877162 -0.98823015 -0.54592271]
 [-0.02615814  1.00437642  0.64437451 -1.38537865  0.42005442]
 [ 1.43319167  0.08608548 -0.40130591  1.05232244  0.03232405]
 [-0.14638292 -0.94616254 -0.09364021  1.33704142  0.43132745]]
```

Ans 1.11



```
Ans 1.11
Value of v: [ 0.00546286  0.03936253  0.36613307  0.6409606   0.34836192  0.185606
  0.09602111  0.48797433  0.95414628  0.68664831]
```

Solution 2



```
2.1
Time elpased to run forever: 107.73058656828653


2.2
Time elpased to run mat_fast : 0.09126140105945524


2.3
Time Difference : 107.63851364757284
```

References

[1] "numpy.delete — NumPy v1.13 Manual", Docs.scipy.org, 2017. [Online]. Available: https://docs.scipy.org/doc/numpy/reference/generated/numpy.delete.html. [Accessed: 18-Sep- 2017].

[2] "numpy.ndarray.sum — NumPy v1.13 Manual", Docs.scipy.org, 2017. [Online]. Available: https://docs.scipy.org/doc/numpy-1.13.0/reference/generated/numpy.ndarray.sum.html. [Accessed: 18-Sep- 2017].

[3] "numpy.savetxt — NumPy v1.13 Manual", Docs.scipy.org, 2017. [Online]. Available: https://docs.scipy.org/doc/numpy/reference/generated/numpy.savetxt.html. [Accessed: 18-Sep- 2017].

[4] C. Albon, "Bar Plot In MatPlotLib - Python", Chrisalbon.com, 2017. [Online]. Available: https://chrisalbon.com/python/matplotlib_bar_plot.html. [Accessed: 18-Sep- 2017].

[5] "Scatter", Plot.ly, 2017. [Online]. Available: https://plot.ly/matplotlib/scatter/. [Accessed: 18-Sep- 2017].

[6] "9.7. itertools — Functions creating iterators for efficient looping — Python 2.7.14 documentation", Docs.python.org, 2017. [Online]. Available: https://docs.python.org/2/library/itertools.html. [Accessed: 18-Sep- 2017].

[7] "Numerical & Scientific Computing with Python: Creating Subplots with Python and Matplotlib", Python-course.eu, 2017. [Online]. Available: https://www.python-course.eu/matplotlib_multiple_figures.php. [Accessed: 18-Sep- 2017].

[8]"Random sampling (numpy.random) — NumPy v1.13 Manual", Docs.scipy.org, 2017. [Online]. Available: https://docs.scipy.org/doc/numpy-1.13.0/reference/routines.random.html. [Accessed: 18-Sep- 2017].

[9] "numpy.random.rand — NumPy v1.13 Manual", Docs.scipy.org, 2017. [Online]. Available: https://docs.scipy.org/doc/numpy-1.13.0/reference/generated/numpy.random.rand.html. [Accessed: 18-Sep- 2017].