**1. Code, execute and debug programs using NumPy module**

```
import numpy
arr = numpy.array([1, 2, 3, 4, 5])
print(arr)
```

**Output:**

```
[1, 2, 3, 4, 5]
```

**#Numpy using alias**

```
import numpy as np
arr = np.array([1, 2, 3, 4, 5,6,7])
print(arr)
print(arr[3])
print(arr[1:5]) #slicing
print(arr[:4])
print(arr[-3:-1)# Negative indexing
```

**Output:**

```
[1 2 3 4 5]
4
2,3,4,5
[1,2,3,4]
[5,6,7]
```

**#Access 2-D Arrays**

```
import numpy as np
arr = np.array([[1,2,3,4,5], [6,7,8,9,10]])
print('2nd element on 1st row: ', arr[0, 1])
# Negative Indexing
print('Last element from 2nd dim: ', arr[1, -1])
print(arr[0:2, 2])
print(arr[0:2, 1:4])
```

**Output:**

```
2nd element on 1st row:  2
10
[3, 8]
[[2 3 4]
 [7 8 9]]
```

**#Access 3-D Arrays**

```
import numpy as np
arr = np.array([[[1, 2, 3], [4, 5, 6]], [[7, 8, 9], [10, 11, 12]]])
print(arr[0, 1, 2])
```

**Output:**

```
6
```

**2. Code, execute and debug programs using series**

```
import pandas as pd
a = [1, 7, 2]

myvar = pd.Series(a)
print(myvar)

myvar1 = pd.Series(a, index = ["x", "y", "z"])
print(myvar1)
```

**Output:**

```
0  1
1  7
2  2

x  1
y  7
z  2
```

**3.Code, execute and debug programs using dataframes**

```
import pandas as pd
data = {
  "calories": [420, 380, 390],
  "duration": [50, 40, 45]
}

#load data into a DataFrame object:
df = pd.DataFrame(data)
print(df)
print(df.loc[0])

#use a list of indexes:
print(df.loc[[0, 1]])

#select particluar column
print(df[['calories']])
```

**Output:**

```
  calories  duration
0       420        50
1       380        40
2       390        45

calories    420
duration     50
    calories  duration
0       420        50
1       380        40
```

```
      calories
0      420
1      380
2      390
```

**3b. Dataframes using Named Indexes**

```
import pandas as pd

data = {
  "calories": [420, 380, 390],
  "duration": [50, 40, 45]
}

df = pd.DataFrame(data, index = ["day1", "day2", "day3"])

print(df)
```

**Output:**

```
      calories  duration
day1      420        50
day2      380        40
day3      390        4
```