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Experiment 1[a]

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Branch: MCA (AI-ML)

Section/Group: MAM - 3(B)

Semester: II

Subject Name: Machine Learning Lab (24CAP-672)

Aim: Implementation of Python Basic Libraries such as

a. **Math**
b. **NumPy**
c. **Matplotlib**
d. **Seaborn**
e. **SciPy**

Steps:

1. Import the required libraries.
2. Perform operations for each library:
   - Math: Basic mathematical operations like square root, factorial, etc.
   - NumPy: Array creation, basic arithmetic, and matrix operations.
   - Matplotlib: Create a simple line plot and scatter plot.
   - Seaborn: Create a heatmap or pair plot using sample data.
   - SciPy: Solve mathematical equations or perform optimization.

Code And Output:

Math Library:

```
import math
print("Square Root of 16:", math.sqrt(16))
print("Factorial of 5:", math.factorial(5))
```

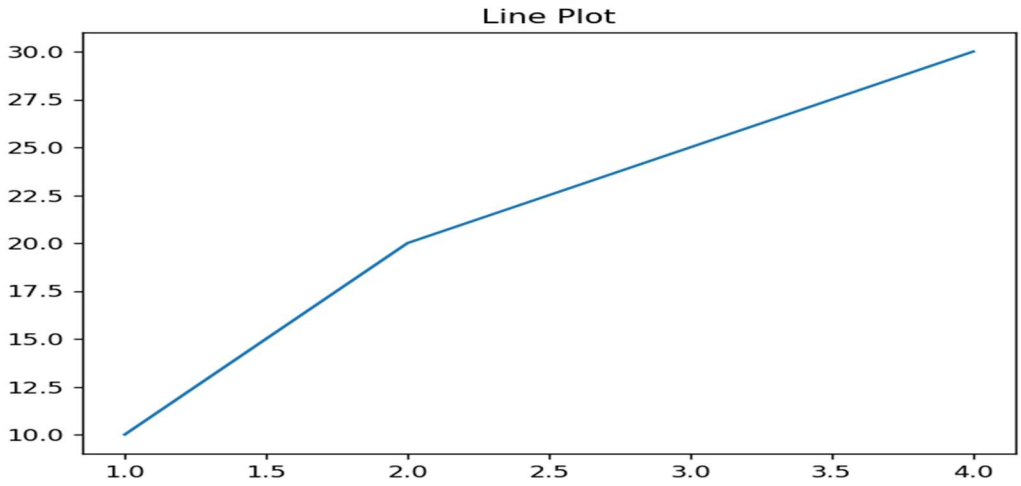
```
PS C:\Users\saxen\Downloads\New> & C:/Users/saxen/AppData/Local/Programs/Python/Python312/
Square Root of 16: 4.0
Factorial of 5: 120
PS C:\Users\saxen\Downloads\New>
```

NumPy Library:

```
import numpy as np
array = np.array([1, 2, 3, 4])
print("Array:", array)
print("Mean of array:", np.mean(array))
```

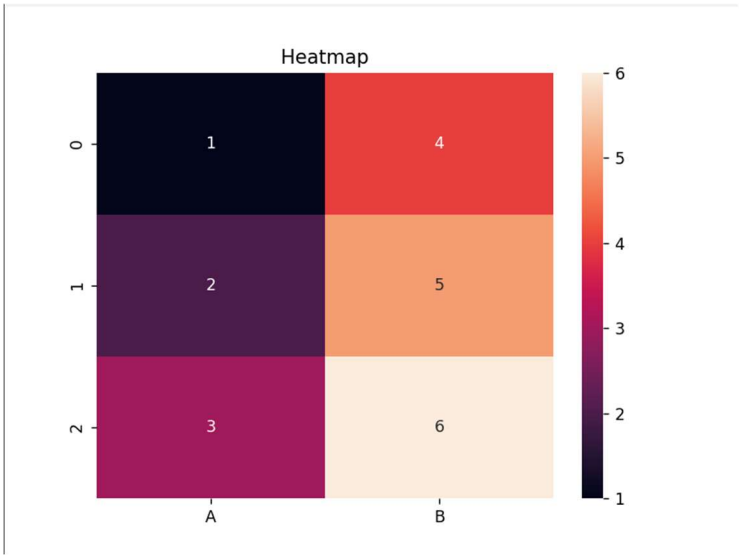
Matplotlib Library:

```
import matplotlib.pyplot as plt
x = [1, 2, 3, 4]
y = [10, 20, 25, 30]
plt.plot(x, y)
plt.title("Line Plot")
plt.show()
```



Seaborn Library:

```
import matplotlib.pyplot as plt
import seaborn as sns
import pandas as pd
data = pd.DataFrame({'A': [1, 2, 3], 'B': [4, 5, 6]})
sns.heatmap(data, annot=True)
plt.title("Heatmap")
plt.show()
```



SciPy Library:

```
from scipy import optimize
def func(x):
    return x**2 + 5*x + 6
result = optimize.minimize(func, 0)
print("Optimization Result:", result)
```

```
PS C:\Users\saxen\Downloads\New> python .\index.py
Optimization Result:   message: Optimization terminated successfully.
  success: True
   status: 0
      fun: -0.2499999999999991
        x: [-2.500e+00]
      nit: 2
      jac: [-5.960e-08]
 hess_inv: [[ 5.000e-01]]
     nfev: 6
     njev: 3
PS C:\Users\saxen\Downloads\New>
```

Learning Outcome:

Learned the functionalities of Math, NumPy, Matplotlib, Seaborn, and SciPy libraries and their importance in Python programming.