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COURSE: FINLATICS DATA SCIENCE EXPERIENCE PROGRAM

Q1) Write a Python program to initialize a 3x3 NumPy array with any integer values of your choice. Then, perform the following operations: Multiply the entire array by 2. Add 5 to each element of the array. Calculate the square of each element in the array. Print the original array and the results of each operation.

```
import numpy as np
a = np.array([[1, 2, 3], [4, 5, 6], [7, 8, 9]])
b = a * 2
c = a + 5
d = a ** 2
print("Original array:")
print(a)
print("Array multiplied by 2:")
print(b)
print("Array with 5 added to each element:")
print(c)
print("Array with each element squared:")
print(d)
```

```
Original array:
[[1 2 3]
 [4 5 6]
 [7 8 9]]
Array multiplied by 2:
[[ 2  4  6]
 [ 8 10 12]
 [14 16 18]]
Array with 5 added to each element:
[[ 6  7  8]
 [ 9 10 11]
 [12 13 14]]
Array with each element squared:
[[ 1  4  9]
 [16 25 36]
 [49 64 81]]
```

Q2) Write a Python program to initialize a 3x3 NumPy array with any integer values of your choice. Then, perform the following slicing operations: Extract the first row of the array.

Extract the last column of the array. Extract a 2x2 sub-array from the center of the original array.

```
import numpy as np
a = np.array([[1, 2, 3], [4, 5, 6], [7, 8, 9]])
first_row = a[0, :]
last_column = a[:, 2]
center_subarray = a[1:3, 1:3]
print("Original array:")
print(a)
print("First row:")
print(first_row)
print("Last column:")
print(last_column)
print("Center sub-array:")
print(center_subarray)
```

```
Original array:
[[1 2 3]
 [4 5 6]
 [7 8 9]]
First row:
[1 2 3]
Last column:
[3 6 9]
Center sub-array:
[[5 6]
 [8 9]]
```

Q3) Write a program to create a DataFrame in Python to store the names and marks of 10 students. Each row of the DataFrame should represent a student, with columns as 'Name' and 'Marks'. Populate the DataFrame with appropriate data and then print it.

```
import pandas as pd
df=pd.DataFrame(columns=['Name','Marks'])
for i in range(10):
  name=input("Enter the name of student:")
  marks=int(input("Enter the marks of student:"))
  df.loc[i]=[name,marks]
print(df)
```

```
Enter the name of student:Kohli
Enter the marks of student:82
Enter the name of student:Rohit
Enter the marks of student:92
Enter the name of student:Dhoni
Enter the marks of student:77
Enter the name of student:Jadeja
Enter the marks of student:66
Enter the name of student:Hardik
```

```
Enter the marks of student:72
Enter the name of student:Ashwin
Enter the marks of student:65
Enter the name of student:Axar
Enter the marks of student:47
Enter the name of student:Sanju
Enter the marks of student:76
Enter the name of student:Jos
Enter the marks of student:100
Enter the name of student:Stokes
Enter the marks of student:99
     Name  Marks
0   Kohli     82
1   Rohit     92
2   Dhoni     77
3  Jadeja     66
4  Hardik     72
5  Ashwin     65
6    Axar     47
7   Sanju     76
8     Jos    100
9  Stokes     99
```

Q4) Write a python program to create a DataFrame representing the names and income of 5 employees. The DataFrame should include columns ' Employee_name' and 'Income', and each row should correspond to an individual employee. Use the indices 'a', 'b', 'c', 'd', and 'e' for the DataFrame entries to uniquely identify each employee.

```
import pandas as pd
data = {
    'Employee_name': ['Alice', 'Bob', 'Charlie', 'Diana', 'Eve'],
    'Income': [50000, 60000, 70000, 80000, 90000]
}
df = pd.DataFrame(data, index=['a', 'b', 'c', 'd', 'e'])
print(df)
```

```
  Employee_name  Income
a         Alice   50000
b           Bob   60000
c       Charlie   70000
d         Diana   80000
e           Eve   90000
```

Q5) Imagine you're tasked with visualizing data using Python. You have the following dataset representing the frequency of occurrences for categories A, B, C, D, and E, stored in two lists: x = ['A', 'B', 'C', 'D', 'E'] y = [10, 20, 15, 25, 30] Write a Python script that creates a bar plot to visualize this data. The categories A, B, C, D, and E should be displayed on the x-axis, while the corresponding frequencies should be displayed on the y-axis.

```
import matplotlib.pyplot as plt
plt.title('Bar Plot of Categories')
x = ['A', 'B', 'C', 'D', 'E']
y = [10, 20, 15, 25, 30]
plt.bar(x, y, color='green', align ='center')
plt.xlabel('Categories')
plt.ylabel('Frequency')
plt.show()
```