PROGRAM:

```python
import numpy as np

import pandas as pd

import matplotlib.pyplot as plt

import seaborn as sns


# Creating Different Arrays

arr_1d = np.array([10, 20, 30, 40, 50])

arr_2d = np.array([[1, 2, 3], [4, 5, 6], [7, 8, 9]])

arr_3d = np.array([[[1, 2], [3, 4]], [[5, 6], [7, 8]]])


# Array Operations

reshaped_arr = arr_1d.reshape(5, 1)

sliced_arr = arr_2d[:, 1]  # Select second column

sum_arr = np.sum(arr_1d)

mean_arr = np.mean(arr_1d)

max_arr = np.max(arr_1d)

min_arr = np.min(arr_1d)

broadcast_arr = arr_2d + 10  # Broadcasting


print(f"Original 1D Array: {arr_1d}")

print(f"Reshaped Array:\n{reshaped_arr}")

print(f"Sliced Array: {sliced_arr}")

print(f"Sum: {sum_arr}, Mean: {mean_arr}, Max: {max_arr}, Min: {min_arr}")
```

```python
print(f"Broadcasted Array:\n{broadcast_arr}")


# Creating Pandas DataFrames

df1 = pd.DataFrame({'Index': np.arange(1, 6), 'Value': arr_1d})

df2 = pd.DataFrame({'Index': np.arange(1, 6), 'Squared': arr_1d**2})


# Merging DataFrames (Inner Join)

merged_df = pd.merge(df1, df2, on='Index')

print("\nMerged Data:\n", merged_df)


# Concatenating DataFrames

concat_df = pd.concat([df1, df2], axis=0)

print("\nConcatenated Data:\n", concat_df)


# Adding Product-Quantity Data

products = ['Laptop', 'Phone', 'Tablet', 'Headphones', 'Smartwatch']

quantities = np.array([50, 120, 80, 150, 60])

prices = np.array([700, 500, 300, 200, 250])


product_df = pd.DataFrame({'Product': products, 'Quantity': quantities, 'Price': prices})

print("\nProduct Data:\n", product_df)


# Total Value Calculation

product_df['Total Value'] = product_df['Quantity'] * product_df['Price']
```

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# Plotting

plt.figure(figsize=(14, 10))


# Histogram

plt.subplot(2, 3, 1)

plt.hist(product_df['Quantity'], bins=5, color='purple', alpha=0.7)

plt.title("Histogram of Quantities")

plt.xlabel("Quantity")

plt.ylabel("Frequency")


# Bar Chart

plt.subplot(2, 3, 2)

plt.bar(product_df['Product'], product_df['Quantity'], color='blue')

plt.title("Bar Chart of Products")

plt.xlabel("Product")

plt.ylabel("Quantity")


# Line Chart

plt.subplot(2, 3, 3)

plt.plot(product_df['Product'], product_df['Quantity'], marker='o', linestyle='-', color='green')

plt.title("Line Chart of Quantities")

plt.xlabel("Product")

plt.ylabel("Quantity")
```

```python
# Pie Chart

plt.subplot(2, 3, 4)

plt.pie(product_df['Quantity'], labels=product_df['Product'], autopct='%1.1f%%', colors=['red',
'blue', 'green', 'yellow', 'purple'])

plt.title("Pie Chart of Product Distribution")


# Scatter Plot

plt.subplot(2, 3, 5)

sns.scatterplot(x=product_df['Price'], y=product_df['Quantity'], hue=product_df['Product'],
palette="deep")

plt.title("Scatter Plot: Price vs Quantity")

plt.xlabel("Price")

plt.ylabel("Quantity")


# Box Plot (Corrected for FutureWarning)

plt.subplot(2, 3, 6)

sns.boxplot(x=product_df['Product'], y=product_df['Quantity'], hue=product_df['Product'],
palette="coolwarm", legend=False)

plt.title("Box Plot of Quantities")


# Show Plots

plt.tight_layout()

plt.show()
```

OUTPUT:

```
Original 1D Array: [10 20 30 40 50]
Reshaped Array:
[[10]
 [20]
 [30]
 [40]
 [50]]
Sliced Array: [2 5 8]
Sum: 150, Mean: 30.0, Max: 50, Min: 10
Broadcasted Array:
[[11 12 13]
 [14 15 16]
 [17 18 19]]

Merged Data:
    Index  Value  Squared
0       1     10      100
1       2     20      400
2       3     30      900
3       4     40     1600
4       5     50     2500

Concatenated Data:
    Index  Value  Squared
0       1   10.0      NaN
1       2   20.0      NaN
2       3   30.0      NaN
3       4   40.0      NaN
4       5   50.0      NaN
0       1    NaN    100.0
1       2    NaN    400.0
2       3    NaN    900.0
3       4    NaN   1600.0
4       5    NaN   2500.0

Product Data:
       Product  Quantity  Price
0       Laptop        50    700
1        Phone       120    500
2       Tablet        80    300
3   Headphones       150    200
4   Smartwatch        60    250
```