Advance Python Programming

MCA-372

Assignment – 02

BY

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SUBMITTED TO

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Questions

1. Plot a line graph showing the Total Sales over the years. Label the x-axis as "Year" and the y-axis as "Total Sales.
2. Draw a line graph with two lines, one for Total Sales and another for Profit over the years. Use different colors and a legend.
3. Plot a 3D line graph showing the trend of Q1, Q2, Q3, and Q4 sales over the years in a single 3D plot. Each quarter should have a different colored line.
4. Draw a scatter plot to visualize the relationship between Q1 Sales and Q4 Sales.
5. Create a scatter plot to compare Total Sales vs. Profit for all 15 years.
6. Create a 3D scatter plot where: The X-axis represents Year, The Y-axis represents Total Sales,, The Z-axis represents Profit, Color points based on profit magnitude.
7. Create a bar graph showing Quarterly Sales (Q1, Q2, Q3, Q4) for each year. Ensure bars for different quarters are distinguishable.
8. Compare Profit across different years using a bar chart where x-axis represents Years and y-axis represents Profit.
9. Visualize all four quarterly sales (Q1, Q2, Q3, Q4) in a stacked bar chart where each year has stacked bars representing the four quarters.

Import Libraries

```python
import matplotlib.pyplot as plt
import pandas as pd
import numpy as np
from mpl_toolkits.mplot3d import Axes3D
```

✓ 0.0s   Python

Import DataSet

```python
data = pd.read_csv("./Sales.csv")
```

✓ 0.0s   Python

```python
data.head()
```

✓ 0.0s   Python

	Year	Q1 Sales	Q2 Sales	Q3 Sales	Q4 Sales	Total Sales	Profit
0	2010	151	162	174	195	682	155
1	2011	192	213	227	244	876	213
2	2012	114	129	157	181	581	139
3	2013	171	182	198	210	761	159
4	2014	160	170	188	211	729	176

```python
data.tail()
```

✓ 0.0s   Python

	Year	Q1 Sales	Q2 Sales	Q3 Sales	Q4 Sales	Total Sales	Profit
10	2020	187	211	229	240	867	153
11	2021	199	223	234	249	905	210
12	2022	123	151	180	199	653	121
13	2023	102	123	147	160	532	94
14	2024	121	150	166	193	630	128

First Program for Total Sales Over Years

```python
plt.figure(figsize=(10,5))
plt.plot(data["Year"], data["Total Sales"], marker='o', linestyle='-', color='black', label="Total Sales")
plt.xlabel("Year")
plt.ylabel("Total Sales")
plt.title("Total Sales Over the Years")
plt.legend()
plt.show()
```

✓ 0.4s

Python
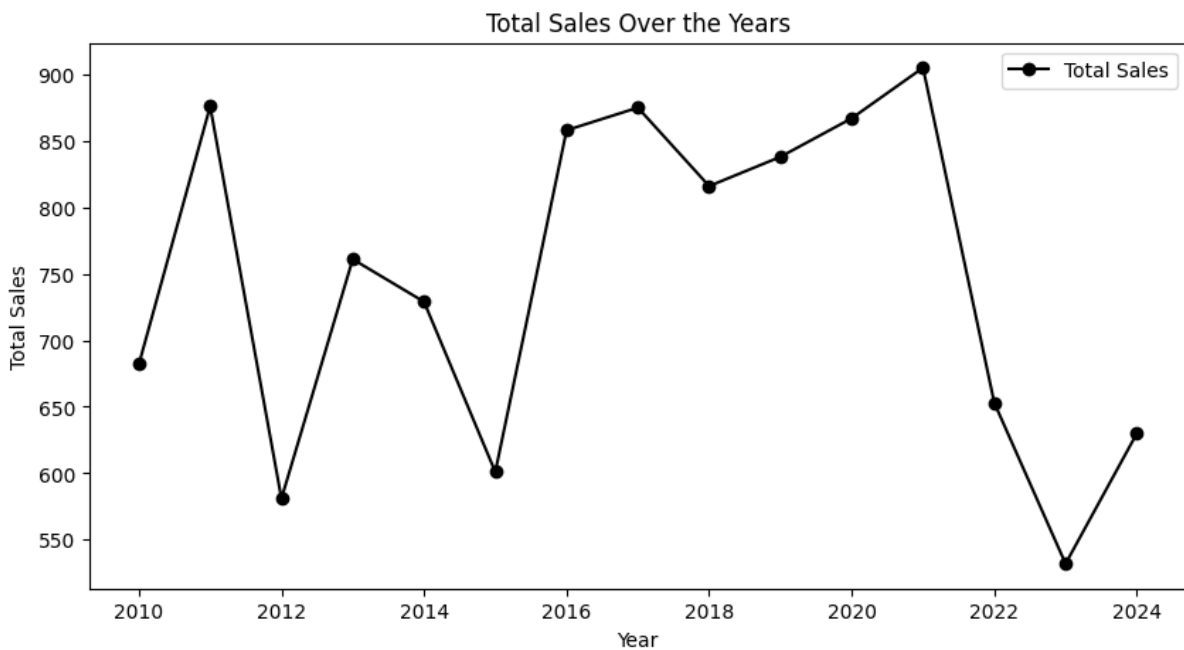
2nd Program for Total Sales and Profit Over the Years

```python
plt.figure(figsize=(10,5))
plt.plot(data["Year"], data["Total Sales"], marker='s', linestyle='-', color='black', label="Total Sales")
plt.plot(data["Year"], data["Profit"], marker='p', linestyle='-', color='red', label="Profit")
plt.xlabel("Year")
plt.ylabel("Value")
plt.title("Total Sales and Profit Over the Years")
plt.legend()
plt.show()
```

✓ 0.4s

Python

Total Sales and Profit Over the Years
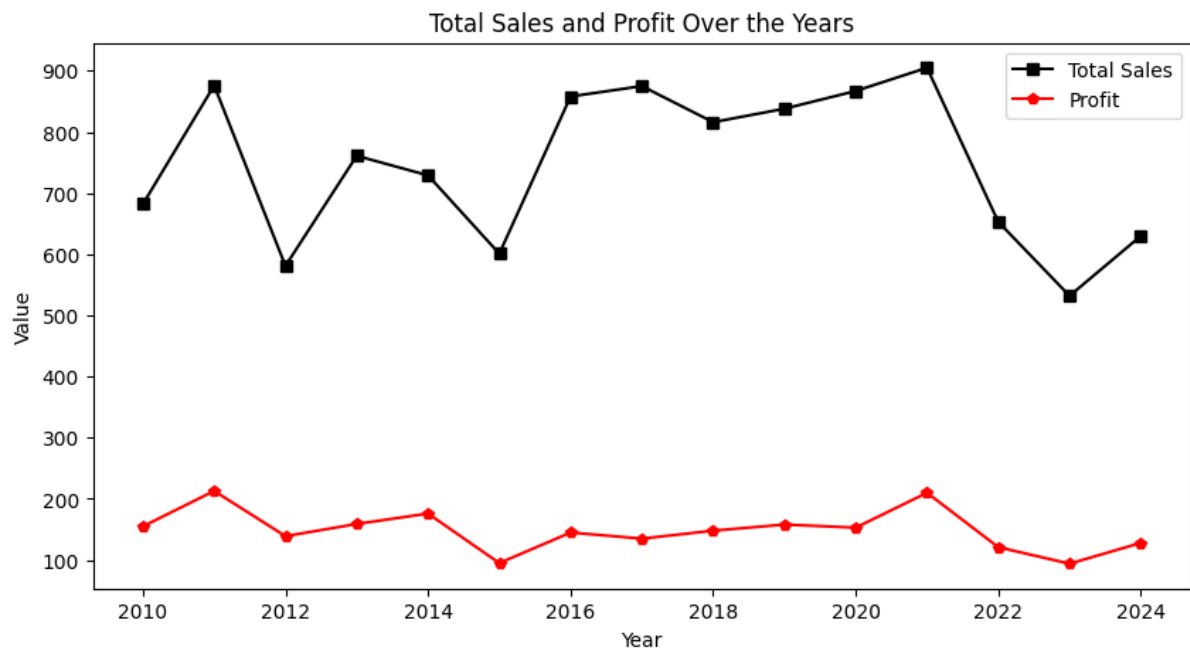
3rd Program for Quarterly Sales Over the Years in 3D

```python
fig = plt.figure(figsize=(10,6))
ax = fig.add_subplot(111, projection='3d')

ax.plot(data["Year"], data["Q1 Sales"], zs=1, zdir='z', label='Q1 Sales', color='r', marker='p')
ax.plot(data["Year"], data["Q2 Sales"], zs=2, zdir='z', label='Q2 Sales', color='g', marker='o')
ax.plot(data["Year"], data["Q3 Sales"], zs=3, zdir='z', label='Q3 Sales', color='b', marker='s')
ax.plot(data["Year"], data["Q4 Sales"], zs=4, zdir='z', label='Q4 Sales', color='c', marker='^')

ax.set_xlabel("Year")
ax.set_ylabel("Sales")
ax.set_zlabel("Quarter")
ax.set_title("Quarterly Sales Over the Years in 3D")

plt.legend()
plt.show()
```

✓ 0.5s   Python
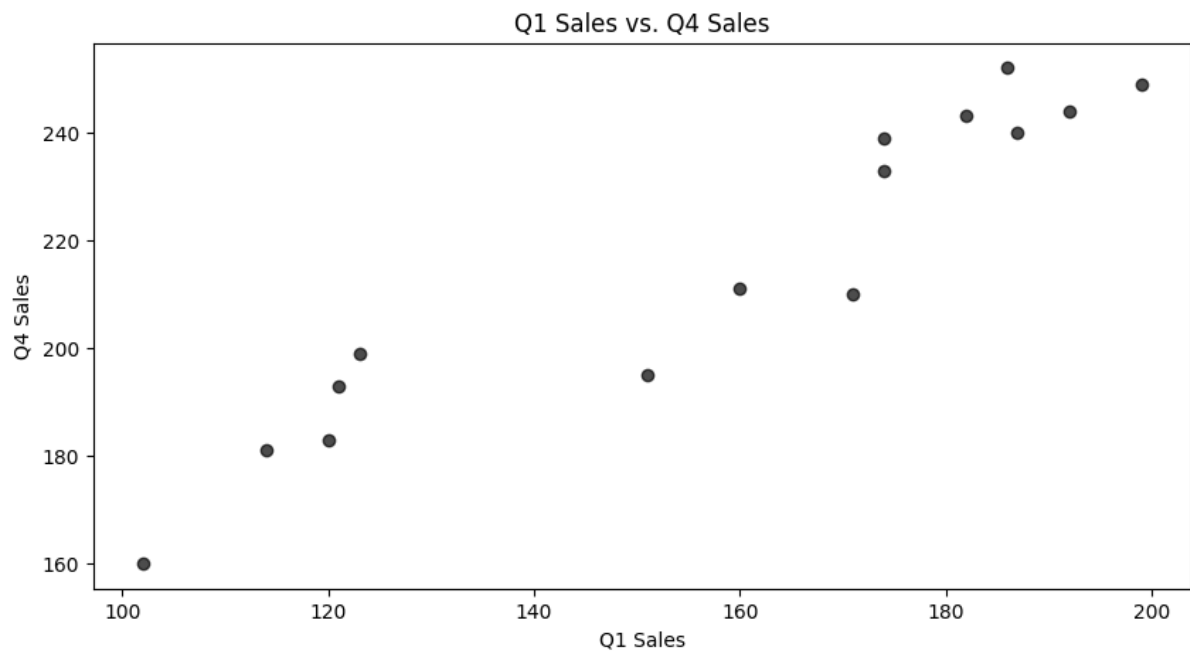
Quarterly Sales Over the Years in 3D

4th Program for Q1 Sales vs. Q4 Sales

```python
plt.figure(figsize=(10, 5))
plt.scatter(data["Q1 Sales"], data["Q4 Sales"], color='black', alpha=0.7)
plt.xlabel("Q1 Sales")
plt.ylabel("Q4 Sales")
plt.title("Q1 Sales vs. Q4 Sales")
plt.show()
```
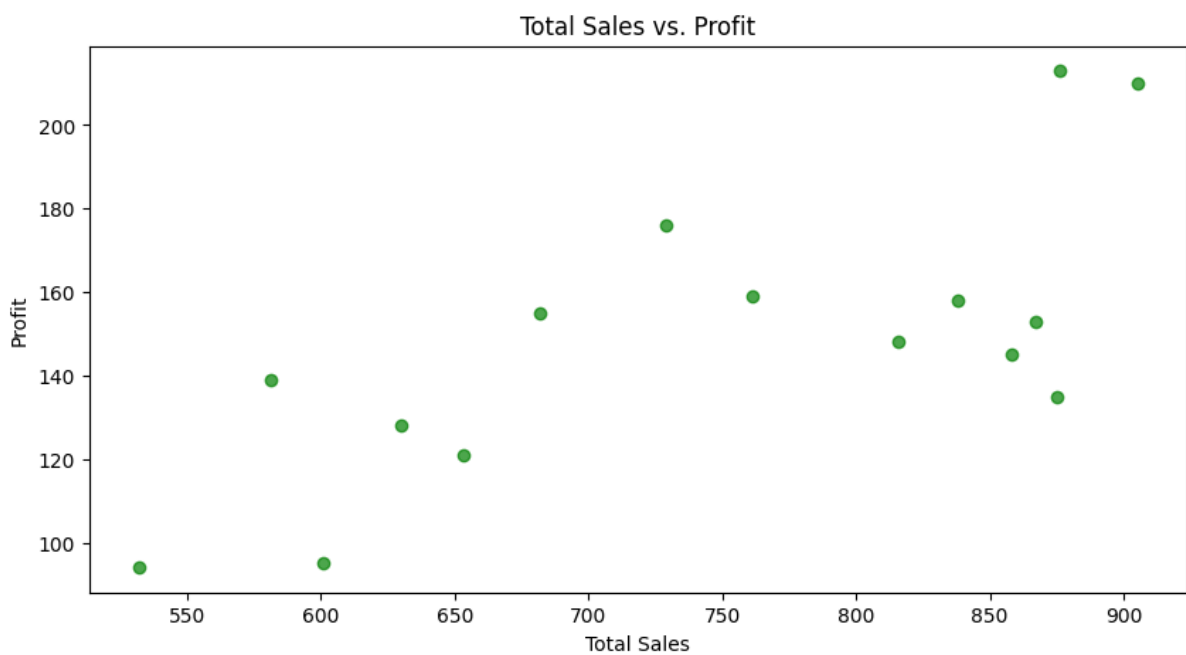
✓ 0.2s

Python

Q1 Sales vs. Q4 Sales

5th Program for Total Sales vs. Profit

```python
plt.figure(figsize=(10, 5))
plt.scatter(data["Total Sales"], data["Profit"], color='green', alpha=0.7)
plt.xlabel("Total Sales")
plt.ylabel("Profit")
plt.title("Total Sales vs. Profit")
plt.show()
```
✓ 0.3s   Python

Total Sales vs. Profit

6th Program for 3D Scatter Plot: Year vs. Total Sales vs. Profit

```python
fig = plt.figure(figsize=(10, 8))
ax = fig.add_subplot(111, projection='3d')

colors = np.where(data["Profit"] > data["Profit"].mean(), 'r', 'g')

ax.scatter(data["Year"], data["Total Sales"], data["Profit"], c=colors, alpha=0.7)
ax.set_xlabel("Year")
ax.set_ylabel("Total Sales")
ax.set_zlabel("Profit")
ax.set_title("3D Scatter Plot: Year vs. Total Sales vs. Profit")

plt.show()
```
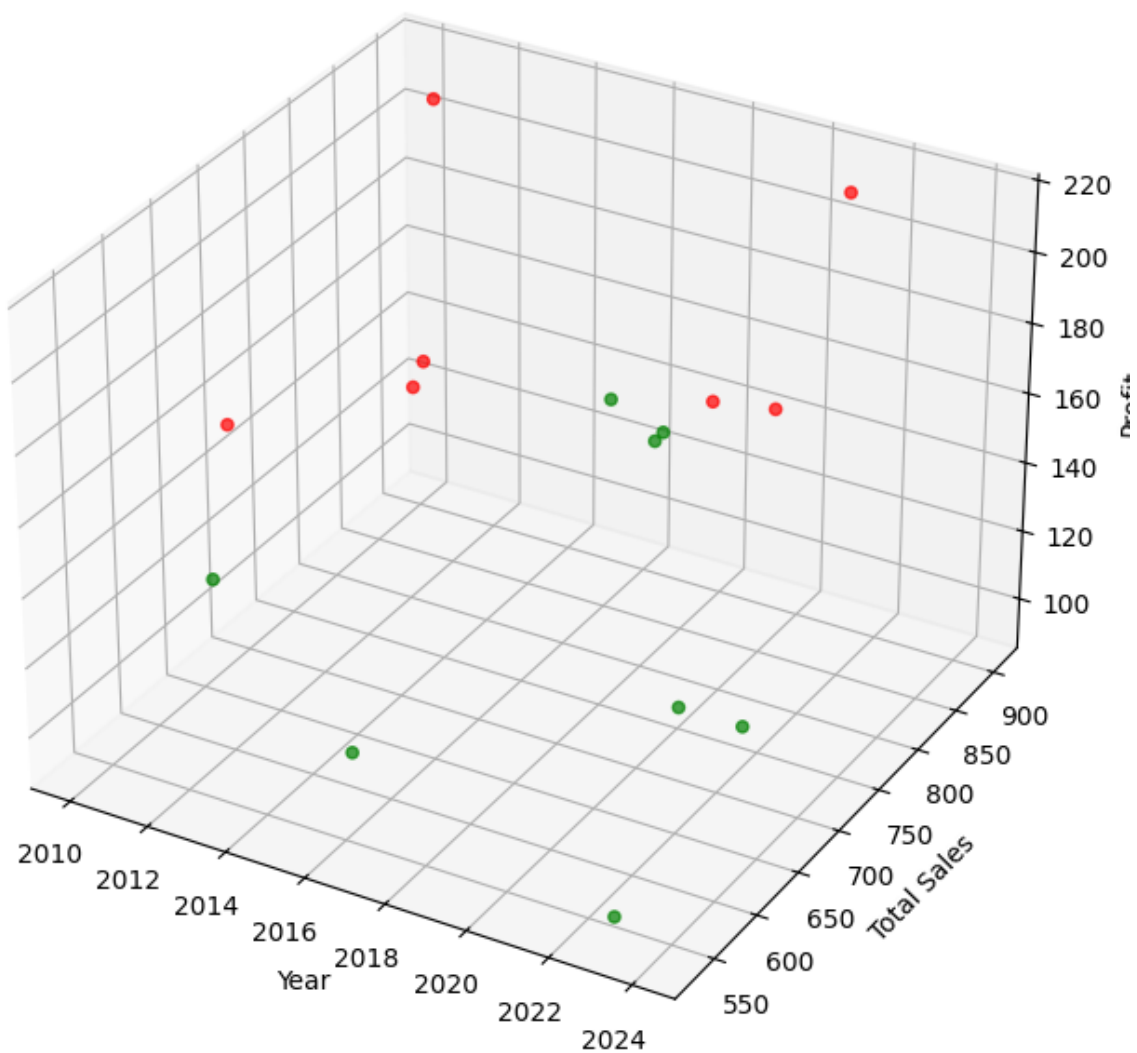
✓ 0.4s   Python

3D Scatter Plot: Year vs. Total Sales vs. Profit
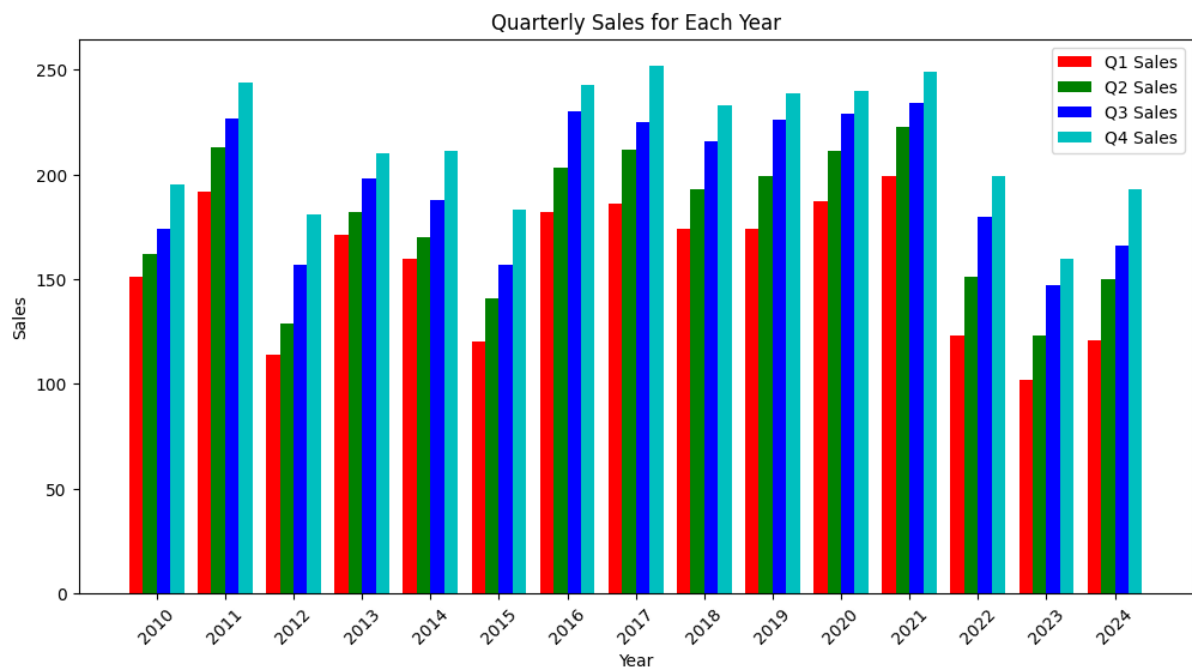
7th Program for Quarterly Sales for Each Year

```python
bar_width = 0.2
x = np.arange(len(data["Year"]))

plt.figure(figsize=(12, 6))
plt.bar(x - bar_width*1.5, data["Q1 Sales"], width=bar_width, label="Q1 Sales", color='r')
plt.bar(x - bar_width/2, data["Q2 Sales"], width=bar_width, label="Q2 Sales", color='g')
plt.bar(x + bar_width/2, data["Q3 Sales"], width=bar_width, label="Q3 Sales", color='b')
plt.bar(x + bar_width*1.5, data["Q4 Sales"], width=bar_width, label="Q4 Sales", color='c')

plt.xlabel("Year")
plt.ylabel("Sales")
plt.xticks(ticks=x, labels=data["Year"], rotation=45)
plt.title("Quarterly Sales for Each Year")
plt.legend()
plt.show()
```

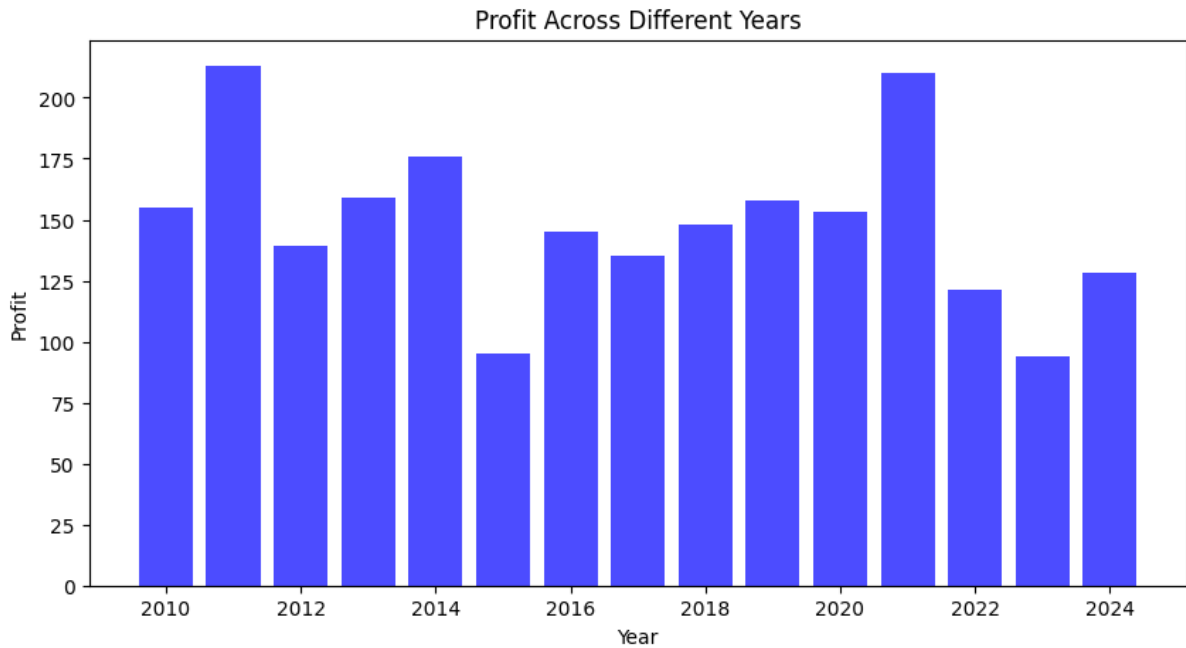✓ 0.7s   Python

8th Program for Profit Across Different Years

```python
plt.figure(figsize=(10, 5))
plt.bar(data["Year"], data["Profit"], color='b', alpha=0.7)
plt.xlabel("Year")
plt.ylabel("Profit")
plt.title("Profit Across Different Years")
plt.show()
```

✓ 0.3s   Python

Profit Across Different Years

9th Program for Quarterly Sales Stacked Bar Chart

```python
plt.figure(figsize=(12, 6))
plt.bar(data["Year"], data["Q1 Sales"], label="Q1 Sales", color='r')
plt.bar(data["Year"], data["Q2 Sales"], bottom=data["Q1 Sales"], label="Q2 Sales", color='g')
plt.bar(data["Year"], data["Q3 Sales"], bottom=data["Q1 Sales"] + data["Q2 Sales"], label="Q3 Sales", color='b')
plt.bar(data["Year"], data["Q4 Sales"], bottom=data["Q1 Sales"] + data["Q2 Sales"] + data["Q3 Sales"], label="Q4 Sales", color='c')

plt.xlabel("Year")
plt.ylabel("Total Quarterly Sales")
plt.title("Quarterly Sales Stacked Bar Chart")
plt.legend()
plt.show()
```

Quarterly Sales Stacked Bar Chart