Amit Divekar | Practical 1

2D Plotting with Matplotlib

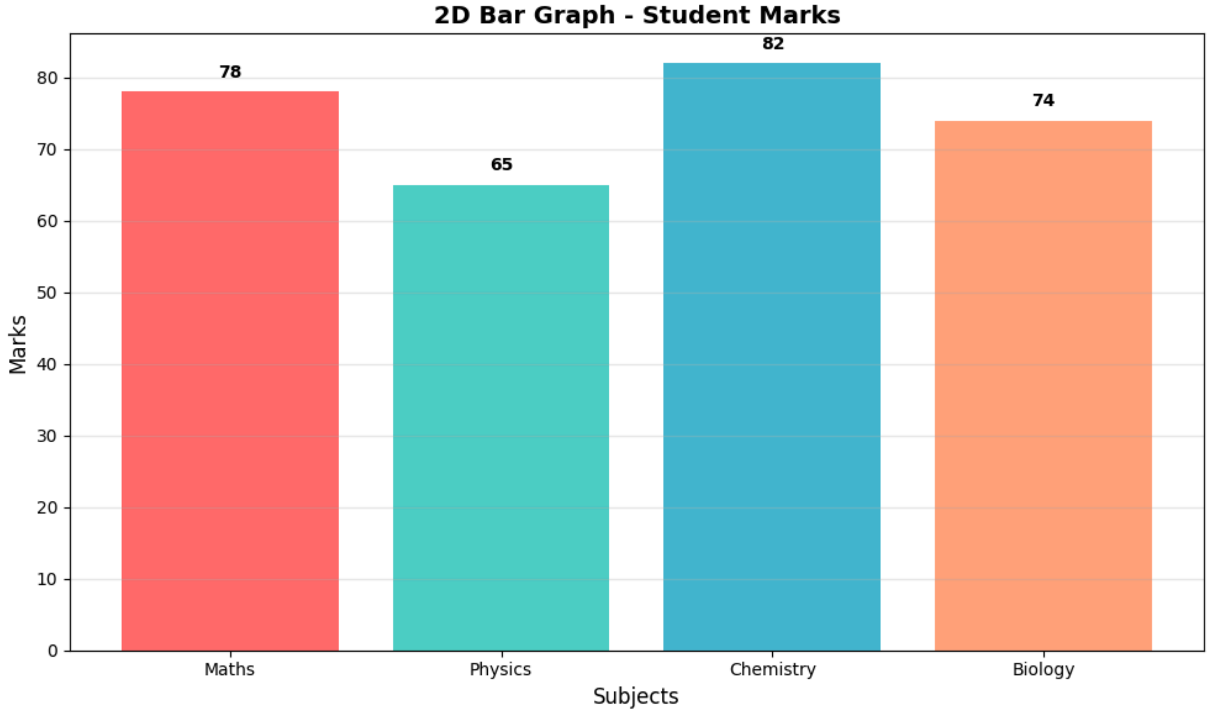
In [1]:

```
import matplotlib.pyplot as plt
import numpy as np
```

Q1. Write a Python program using Matplotlib to draw a 2D bar graph showing the marks obtained by a student in the subjects Maths, Physics, Chemistry, and Biology.

In [2]:

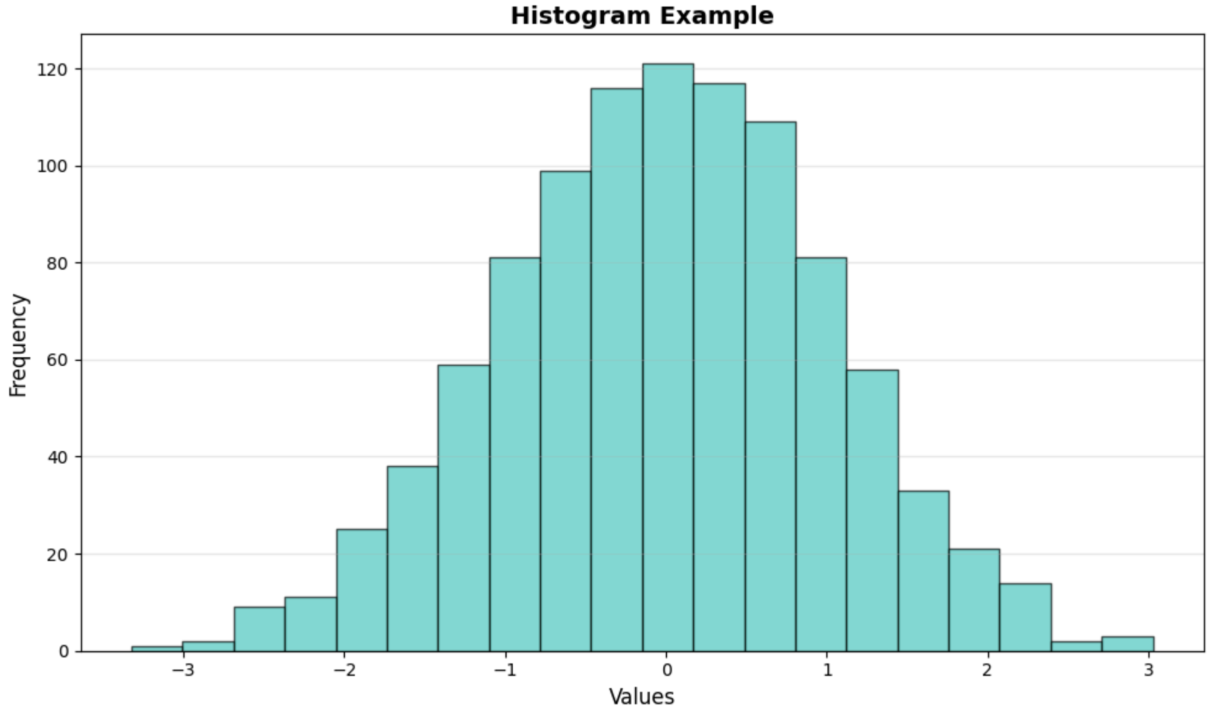
```
import matplotlib.pyplot as plt
subjects = ['Maths', 'Physics', 'Chemistry', 'Biology']
marks = [78, 65, 82, 74]
plt.figure(figsize=(10, 6))
plt.bar(subjects, marks, color=['#FF6B6B', '#4ECDC4', '#45B7D1', '#FFA07A'])
plt.xlabel("Subjects", fontsize=12)
plt.ylabel("Marks", fontsize=12)
plt.title("2D Bar Graph - Student Marks", fontsize=14, fontweight='bold')
plt.grid(axis='y', alpha=0.3)
for i, v in enumerate(marks):
    plt.text(i, v+2, str(v), ha='center', fontweight='bold')
plt.tight_layout()
plt.show()
```



Q2. Write a Python program using NumPy and Matplotlib to generate 1000 random values and plot a histogram with 20 bins.

In [3]:

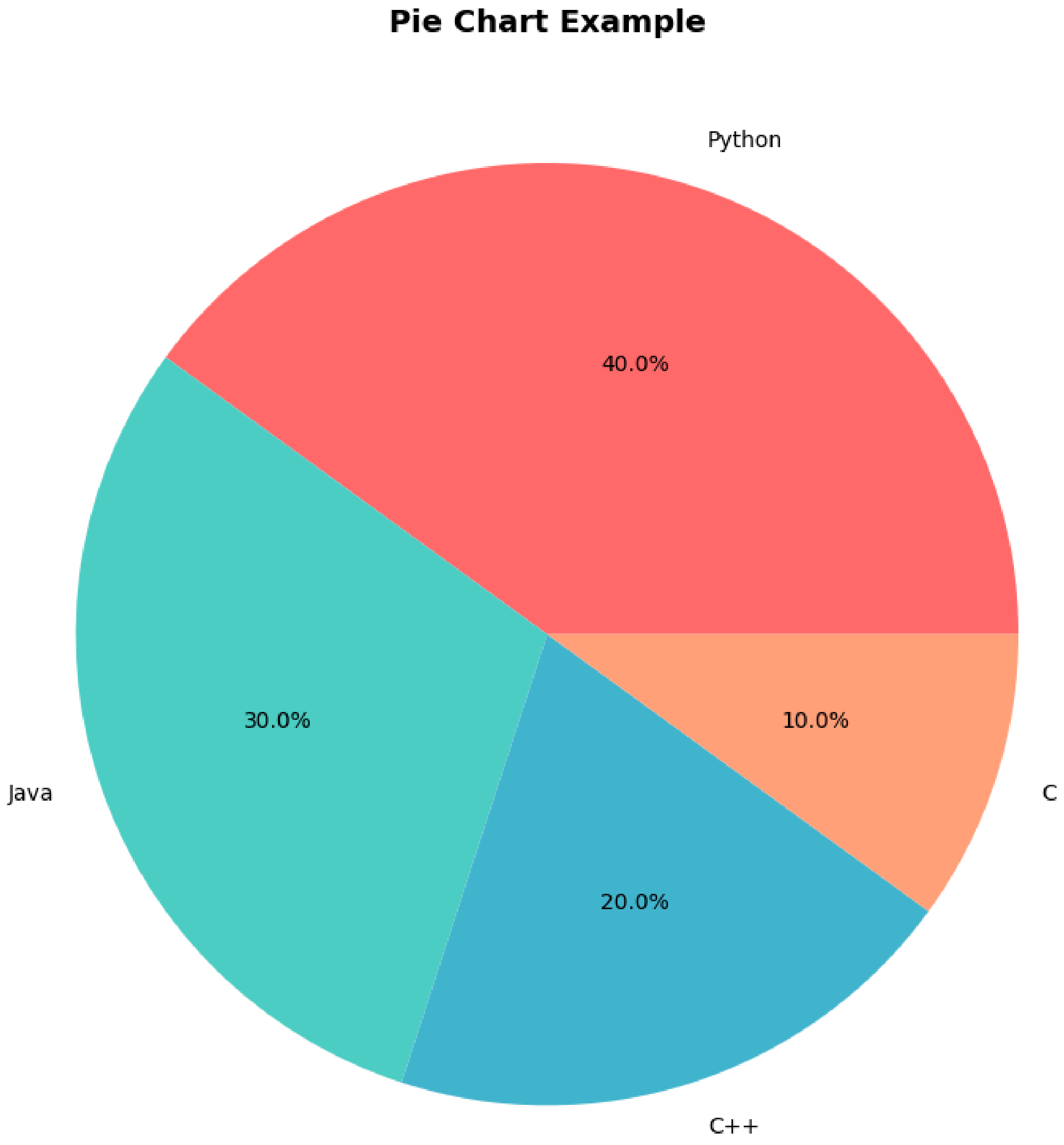
```
import matplotlib.pyplot as plt
import numpy as np
data = np.random.randn(1000)
plt.figure(figsize=(10, 6))
plt.hist(data, bins=20, color='#4ECDC4', edgecolor='black', alpha=0.7)
plt.xlabel("Values", fontsize=12)
plt.ylabel("Frequency", fontsize=12)
plt.title("Histogram Example", fontsize=14, fontweight='bold')
plt.grid(axis='y', alpha=0.3)
plt.tight_layout()
plt.show()
```



Q3. Write a Python program using Matplotlib to draw a pie chart showing the number of students using different programming languages: Python, Java, C++, and C.

In [4]:

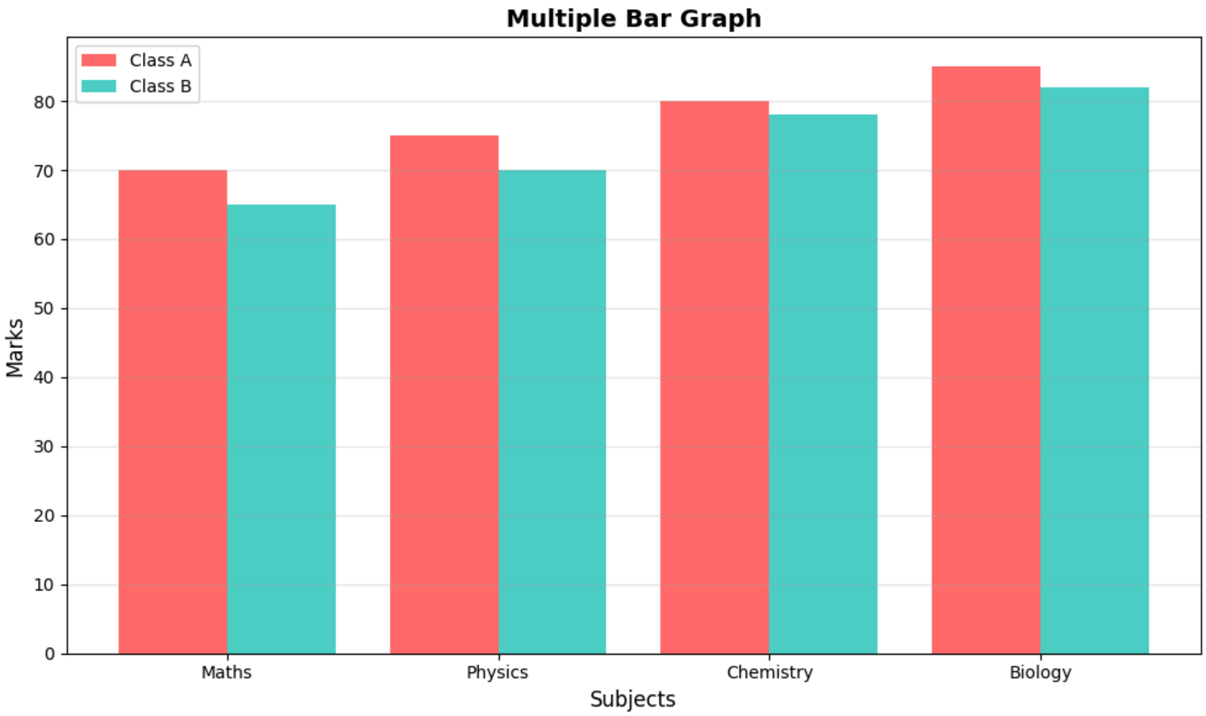
```
import matplotlib.pyplot as plt
languages = ['Python', 'Java', 'C++', 'C']
students = [40, 30, 20, 10]
plt.figure(figsize=(8, 8))
plt.pie(students, labels=languages, autopct='%1.1f%%', colors=['#FF6B6B', '#
plt.title("Pie Chart Example", fontsize=14, fontweight='bold')
plt.tight_layout()
plt.show()
```



Q4. Write a Python program using NumPy and Matplotlib to draw a multiple (grouped) bar graph comparing the marks of Class A and Class B students in the subjects Maths, Physics, Chemistry, and Biology.

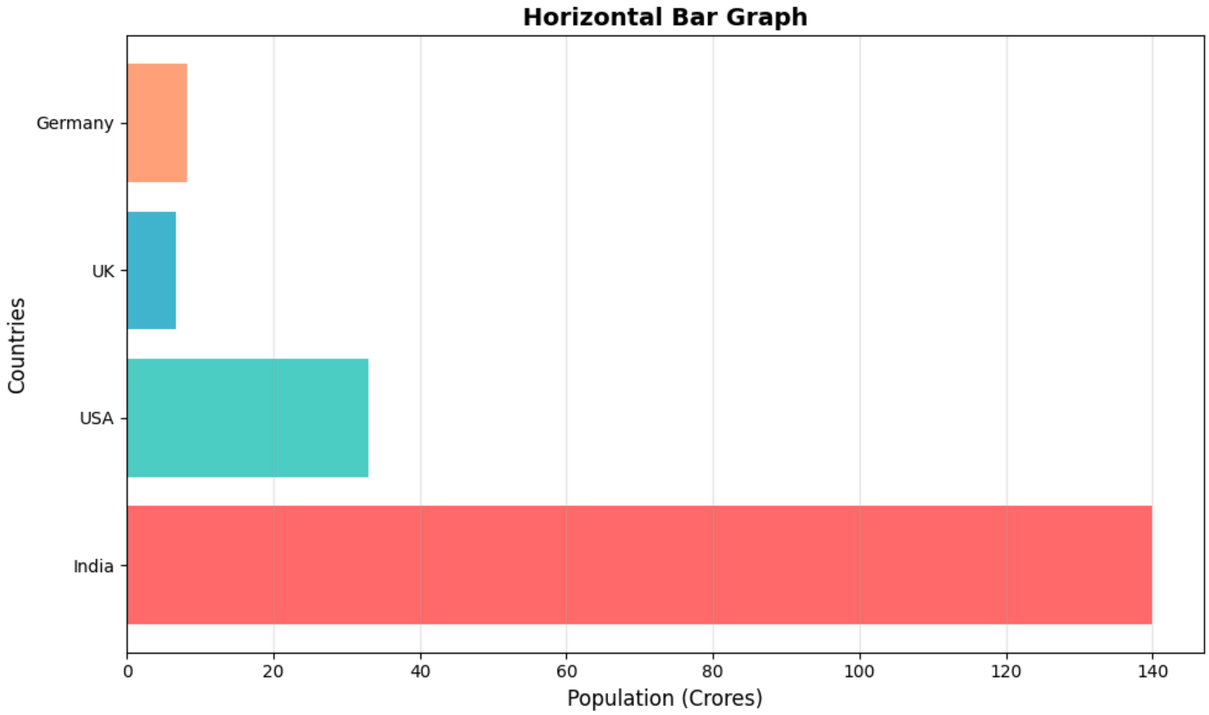
In [5]:

```
import matplotlib.pyplot as plt
import numpy as np
x = np.arange(4)
marks1 = [70, 75, 80, 85]
marks2 = [65, 70, 78, 82]
plt.figure(figsize=(10, 6))
plt.bar(x - 0.2, marks1, width=0.4, label='Class A', color='#FF6B6B')
plt.bar(x + 0.2, marks2, width=0.4, label='Class B', color='#4ECDC4')
plt.xticks(x, ['Maths', 'Physics', 'Chemistry', 'Biology'])
plt.xlabel("Subjects", fontsize=12)
plt.ylabel("Marks", fontsize=12)
plt.title("Multiple Bar Graph", fontsize=14, fontweight='bold')
plt.legend()
plt.grid(axis='y', alpha=0.3)
plt.tight_layout()
plt.show()
```



Q5. Write a Python program using Matplotlib to draw a horizontal bar graph representing the population (in crores) of the countries India, USA, UK, and Germany.

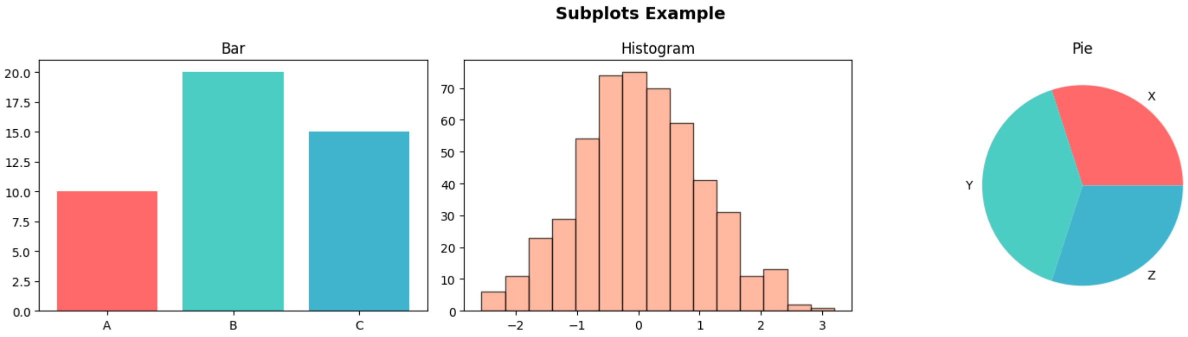
```
In [6]: import matplotlib.pyplot as plt
countries = ['India', 'USA', 'UK', 'Germany']
population = [140, 33, 6.7, 8.3]
plt.figure(figsize=(10, 6))
plt.barh(countries, population, color=['#FF6B6B', '#4ECDC4', '#45B7D1', '#FF
plt.xlabel("Population (Crores)", fontsize=12)
plt.ylabel("Countries", fontsize=12)
plt.title("Horizontal Bar Graph", fontsize=14, fontweight='bold')
plt.grid(axis='x', alpha=0.3)
plt.tight_layout()
plt.show()
```



Q6. Write a Python program using Matplotlib and NumPy to create three different plots (bar graph, histogram, and pie chart) in a single figure using subplots.

In [7]:

```
import matplotlib.pyplot as plt
import numpy as np
plt.figure(figsize=(15, 4))
plt.subplot(1, 3, 1)
plt.bar(['A', 'B', 'C'], [10, 20, 15], color=['#FF6B6B', '#4ECDC4', '#45B7D1
plt.title("Bar")
plt.subplot(1, 3, 2)
plt.hist(np.random.randn(500), bins=15, color='#FFA07A', edgecolor='black',
plt.title("Histogram")
plt.subplot(1, 3, 3)
plt.pie([30, 40, 30], labels=['X', 'Y', 'Z'], colors=['#FF6B6B', '#4ECDC4',
plt.title("Pie")
plt.suptitle("Subplots Example", fontsize=14, fontweight='bold')
plt.tight_layout()
plt.show()
```


Subplots Example
Bar
20.0
17.5
15.0
12.5
10.0
7.5
5.0
2.5
0.0
A
B
C
Histogram
70
60
50
40
30
20
10
0
−2
−1
0
1
2
3
Pie
X
Y
Z