

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

```
city_x = np.array([100, 120, 85, 90, 110, 95])
city_y = np.array([80, 75, 60, 95, 85, 90])
city_z = np.array([150, 140, 135, 160, 155, 170])
```

```
def analyze_data():
```

```
    total_rainfall_x = np.sum(city_x)
    total_rainfall_y = np.sum(city_y)
    total_rainfall_z = np.sum(city_z)
```

```
    print(f"Total rainfall for City X: {total_rainfall_x} mm")
    print(f"Total rainfall for City Y: {total_rainfall_y} mm")
    print(f"Total rainfall for City Z: {total_rainfall_z} mm")
```

```
    average_rainfall_x = np.mean(city_x)
    average_rainfall_y = np.mean(city_y)
    average_rainfall_z = np.mean(city_z)
```

```
    print(f"Average monthly rainfall for City X: {average_rainfall_x:.2f} mm")
    print(f"Average monthly rainfall for City Y: {average_rainfall_y:.2f} mm")
    print(f"Average monthly rainfall for City Z: {average_rainfall_z:.2f} mm")
```

```
    return city_x, city_y, city_z
```

```
def month_wise_analysis(city_x, city_y, city_z):
```

```
    monthly_average_rainfall = np.mean([city_x, city_y, city_z], axis=0)
```

```
    print("Monthly average rainfall across all cities:")
```

```
    for month in range(1, 7):
```

```
        print(f"Month {month}: {monthly_average_rainfall[month-1]:.2f} mm")
```

```
    return monthly_average_rainfall
```

```
def visualize_trends(city_x, city_y, city_z):
```

```
    months = np.arange(1, 7)
```

```
plt.figure(figsize=(12, 6))
plt.subplot(1, 2, 1)
plt.plot(months, city_x, marker='o', label='City X')
plt.plot(months, city_y, marker='o', label='City Y')
plt.plot(months, city_z, marker='o', label='City Z')
```

```
plt.xlabel('Month')
plt.ylabel('Rainfall (mm)')
plt.title('Monthly Rainfall Trend for Each City')
plt.legend()
plt.grid(True)
```

```
plt.subplot(1, 2, 2)
bar_width = 0.25
bar_positions = np.arange(len(months))
```

```
plt.bar(bar_positions, city_x, width=bar_width, label='City X')
plt.bar(bar_positions + bar_width, city_y, width=bar_width, label='City Y')
plt.bar(bar_positions + 2 * bar_width, city_z, width=bar_width, label='City Z')
```

```
plt.xlabel('Month')
plt.ylabel('Rainfall (mm)')
plt.title('Rainfall Distribution Comparison')
plt.xticks(bar_positions + bar_width, ['Month 1', 'Month 2', 'Month 3', 'Month 4', 'Month 5',
'Month 6'])
plt.legend()

plt.tight_layout()
plt.show()
```

```
def main():
    city_x, city_y, city_z = analyze_data()
    monthly_average_rainfall = month_wise_analysis(city_x, city_y, city_z)
    visualize_trends(city_x, city_y, city_z)

if __name__ == "__main__":
    main()
```

Total rainfall for City X: 600 mm
Total rainfall for City Y: 485 mm
Total rainfall for City Z: 910 mm
Average monthly rainfall for City X: 100.00 mm
Average monthly rainfall for City Y: 80.83 mm
Average monthly rainfall for City Z: 151.67 mm
Monthly average rainfall across all cities:
Month 1: 110.00 mm
Month 2: 111.67 mm
Month 3: 93.33 mm
Month 4: 115.00 mm
Month 5: 116.67 mm
Month 6: 118.33 mm

