



B.Pharm Semester 1

PHARMACY | PEOPLE | A HEALTHIER TOMORROW

*Science
Meets
Solutions*

MEDICINES
DATA
IDEAS
BETTER HEALTH

Basics of Python Programming for Pharmaceutical Sciences

Unit 5

Data Visualization with Matplotlib

PPT Notes



Learn



Code



Explore

KNOWLEDGE TODAY
BETTER CARE TOMORROW

*Data
Drives
Better Health*



Learn • Code • Explore

PYTHON
FOR PHARMACY

Drug Data Analysis

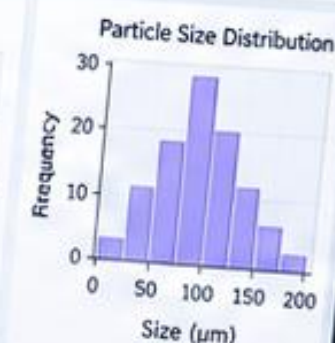
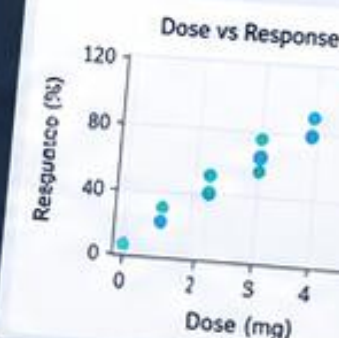
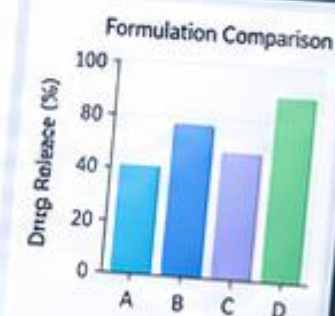
Pharmaceutical Research

Healthcare Insights

```
# Data Visualization
import matplotlib.pyplot as plt
import numpy as np

# Sample pharmaceutical data
time = [0, 1, 2, 3, 4, 5]
conc = [0, 12, 28, 40, 35, 20]

plt.plot(time, conc, marker='o',
         color='#2E86DE', linewidth=2)
plt.title('Drug Concentration')
plt.xlabel('Time (hours)')
plt.ylabel('Concentration (µg/mL)')
plt.grid(True)
plt.show()
```



INTRODUCTION TO MATPLOTLIB

Features, Applications and Import

Matplotlib is an open-source Python library for creating graphs and charts.

Graphs help us see trends, compare observations and understand numerical data.

Features

- Create line plots, histograms, scatter plots, box plots and bar charts.
- Change colours, markers, labels and styles. Show several datasets together.
- Save figures as PNG, JPG, PDF or SVG.

Applications

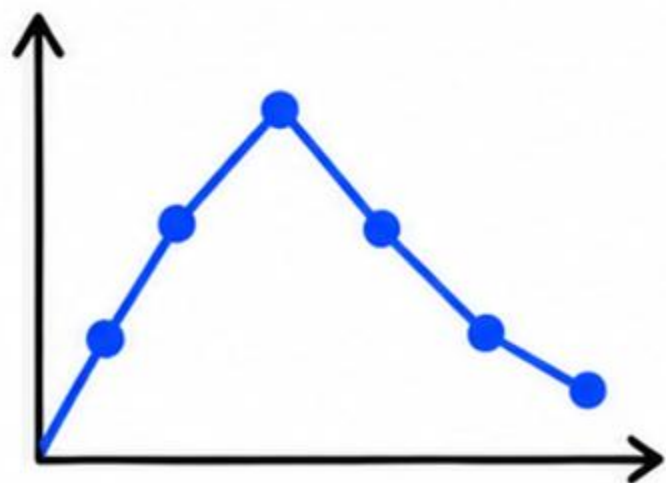
- PK concentration-time curves, ADR reports, dissolution profiles and laboratory data.
- Also useful for business analysis, research presentations and teaching.

Import

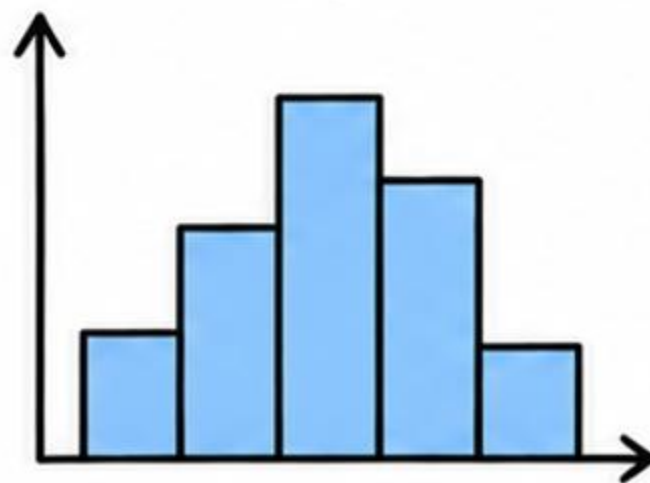
```
import matplotlib.pyplot as plt
```

- plt is the usual alias for the pyplot interface.
- Matplotlib works with Python lists, NumPy arrays and Pandas data.

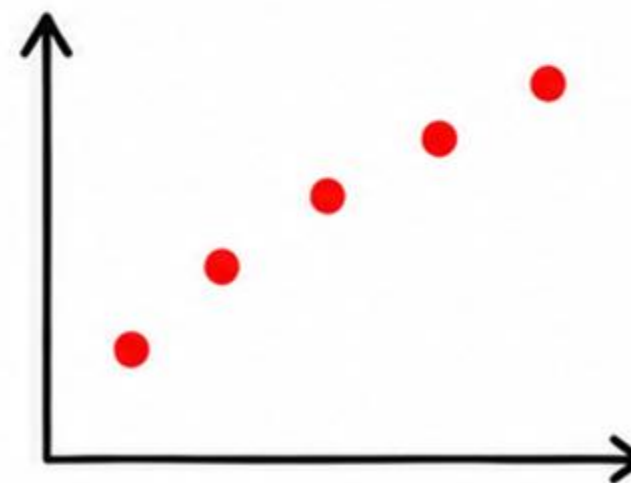
Line Plot



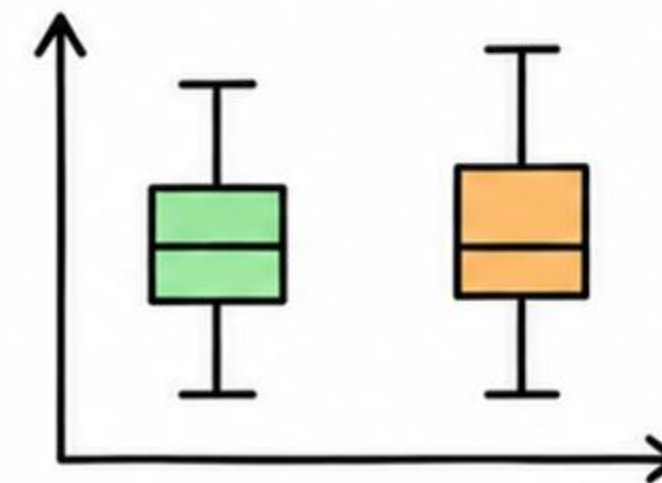
Histogram



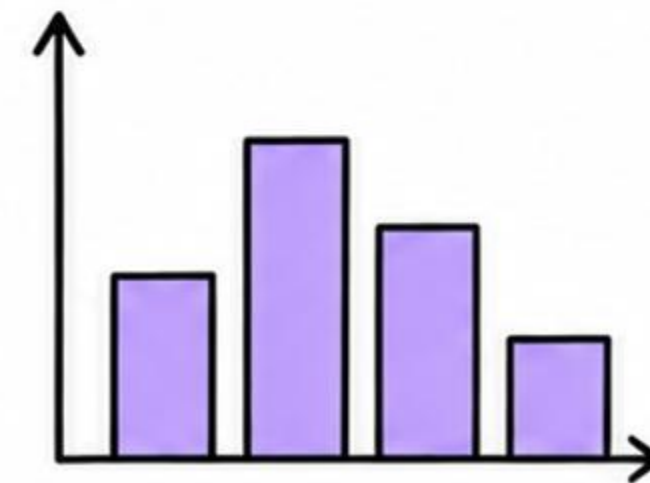
Scatter Plot



Box Plot



Bar Chart



CREATING LINE PLOTS

Simple Line Plot and Styling

A line plot joins successive data points with straight segments. It shows changes across ordered measurements.

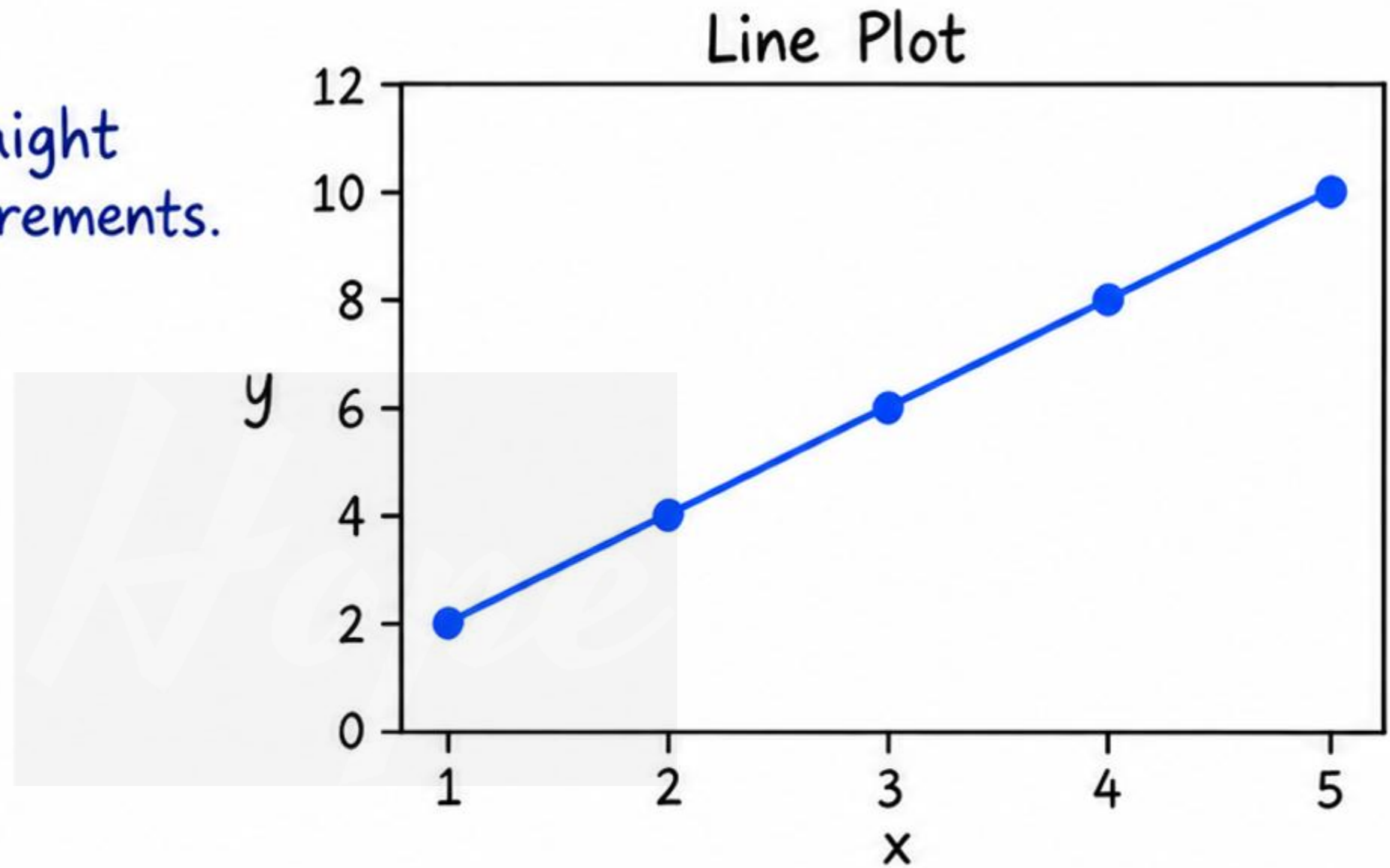
```
import matplotlib.pyplot as plt
x = [1, 2, 3, 4, 5]
y = [2, 4, 6, 8, 10]
plt.plot(x, y)
plt.show()
```

Styling options

```
plt.plot(x, y, marker="o", color="blue",
         linestyle="--", linewidth=3)
```

Uses

Use line plots for time trends and concentration-time curves.



- `marker="o"` adds circles.
- `color` changes ink colour.
- `linestyle="--"` makes a dashed line.
- `linewidth` controls thickness.

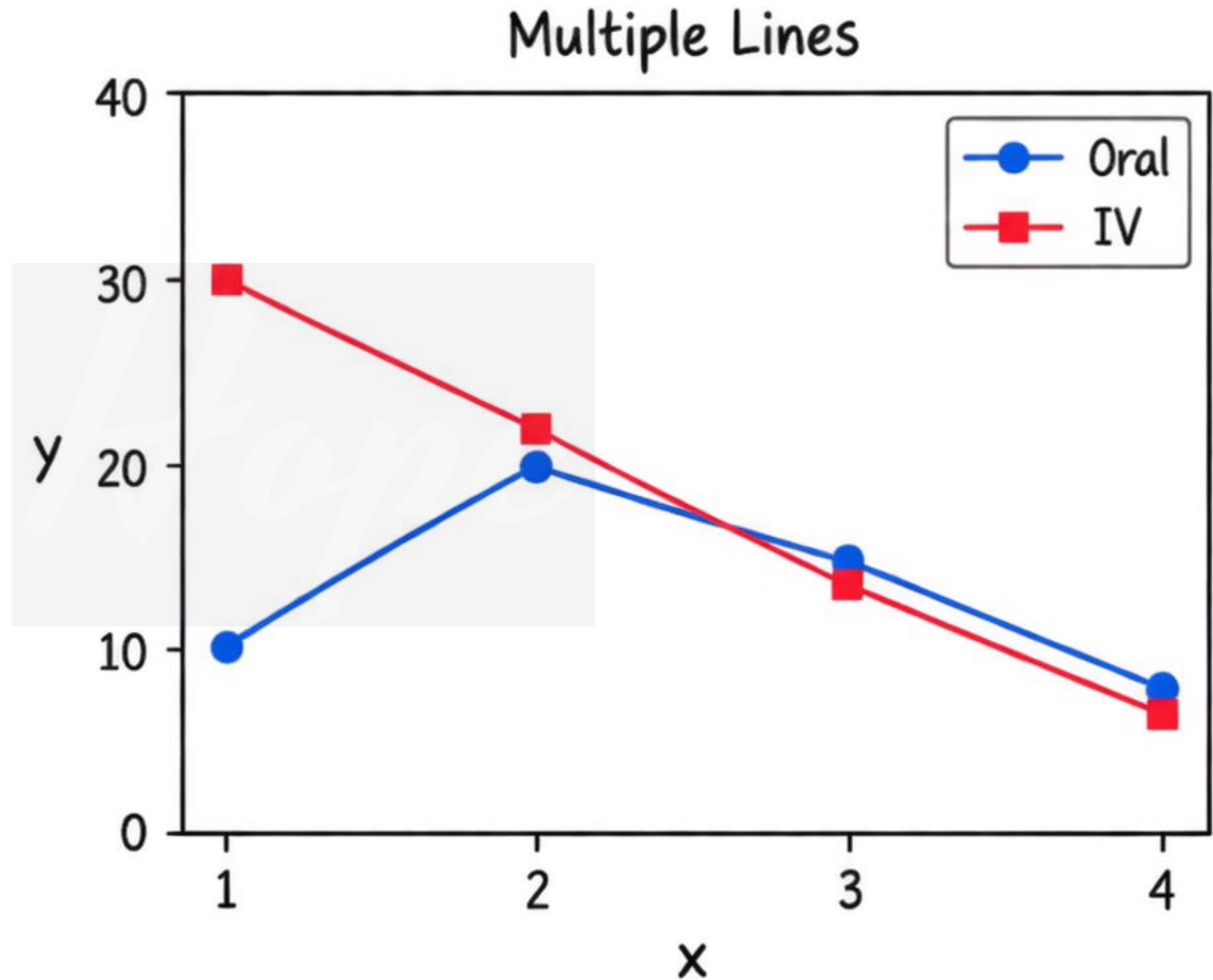
CREATING LINE PLOTS

Multiple Lines

Several datasets can share the same axes.

```
import matplotlib.pyplot as plt
x = [1, 2, 3, 4]
oral = [10, 20, 15, 8]
iv = [30, 22, 14, 7]
plt.plot(x, oral, marker="o", label="Oral")
plt.plot(x, iv, marker="s", label="IV")
plt.legend()
plt.show()
```

- Multiple lines help compare patterns directly.
- Give each dataset a clear label.
- Keep all plotted values on the same scales.
- These illustrative values are separate from the later detailed PK dataset.



CREATING HISTOGRAMS

Bins, Frequency and Styling

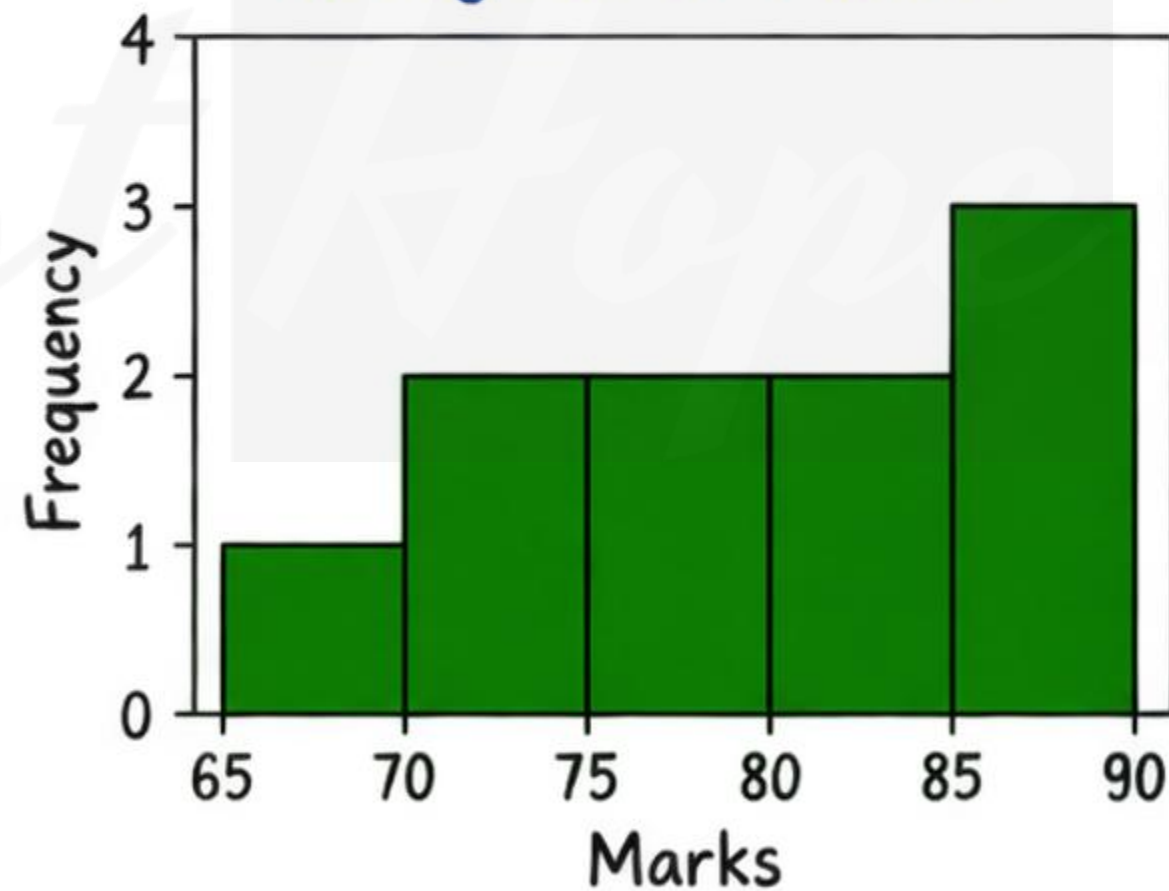
- A histogram shows the distribution of numerical values.
- Bins are intervals. Bar height shows how many observations fall in each interval.

Python Code

```
import matplotlib.pyplot as plt
marks = [65, 70, 72, 75, 78,
        80, 81, 85, 88, 90]
plt.hist(marks, bins=5, color="green",
        edgecolor="black")
plt.xlabel("Marks")
plt.ylabel("Frequency")
plt.show()
```

- bins=5 sets the number of intervals.
- edgecolor adds borders.

Histogram of Marks



Bin Intervals and Counts

Bin interval	Frequency
[65, 70)	1
[70, 75)	2
[75, 80)	2
[80, 85)	2
[85, 90]	3

The last bin includes its right endpoint.

Applications

- Histograms help study ages, laboratory values and unusual observations.



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