



Al-Mustaqbal University

College of Engineering & Technology

Biomedical Engineering Department

Subject Name: Computer 2

2nd Class, Second Semester

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Lecturer: Dr. Ahmed Hasan Al-Janabi

Email: Ahmed.janabi@uomus.edu.iq

Lecture No.: 9

Lecture Title: [Introduction to Data Plotting]





Computer II (MATLAB)

الحاسوب 2
2025-2024

Lecture 9

by

Dr. Ahmed Hasan Al-Janabi
Ahmed.janabi@uomus.edu.iq





Introduction to Data Plotting

- MATLAB provides powerful functions to visualize data effectively.
- Different types of plots: Line plots, scatter plots, bar charts, histograms, and 3D plots.
- Customizing plots for better readability and presentation.



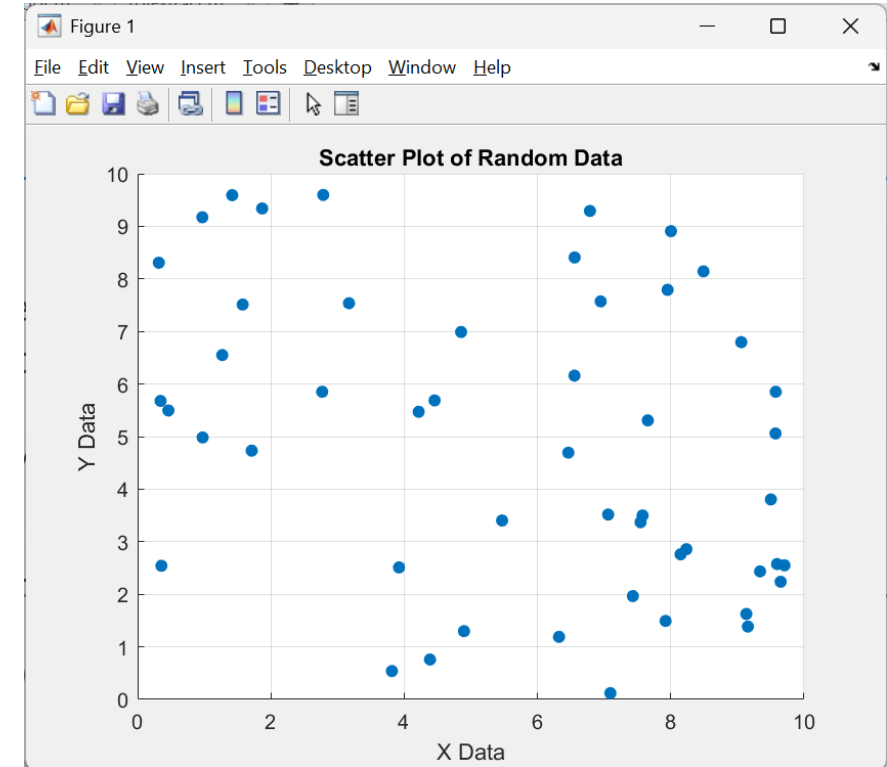
Scatter Plots for Data Visualisation

- Code Example:

```
x = rand(1, 50) * 10;  
y = rand(1, 50) * 10;  
scatter(x, y, 'filled');  
xlabel('X Data');  
ylabel('Y Data');  
title('Scatter Plot of Random Data');  
grid on;
```

- Notes:

- `scatter(x, y, 'filled')` creates a scatter plot with filled markers.
- Useful for analyzing relationships between variables.



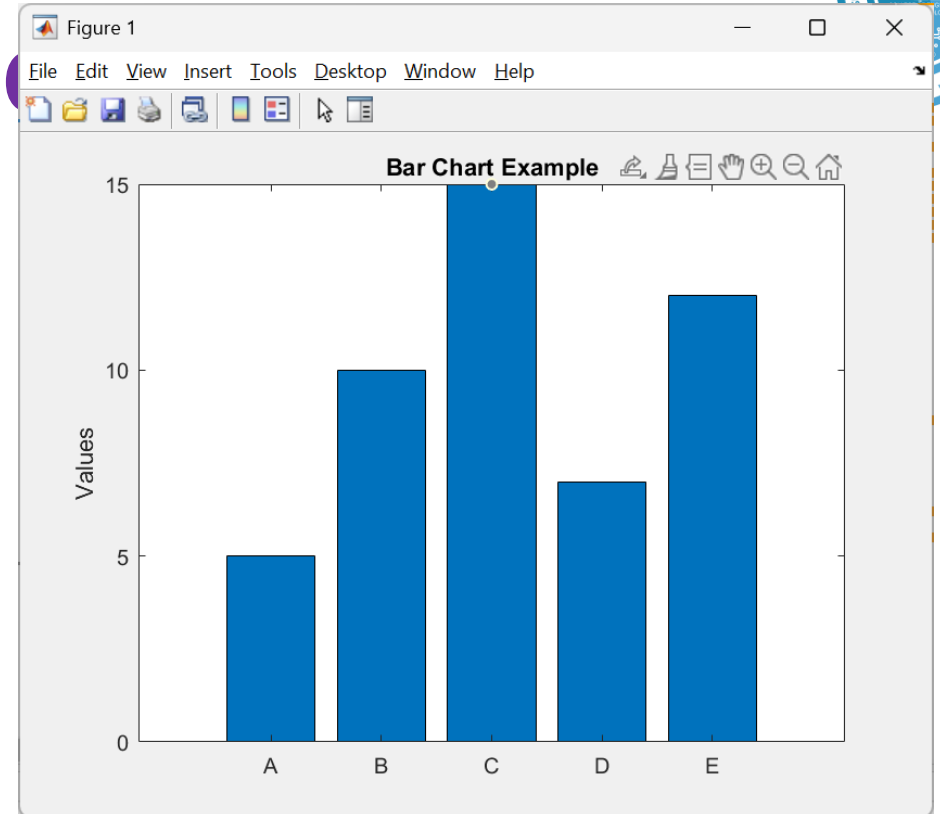
Bar Charts for Categorical

- Code Example:

```
data = [5, 10, 15, 7, 12];  
categories = {'A', 'B', 'C', 'D', 'E'};  
bar(data);  
set(gca, 'XTickLabel', categories);  
ylabel('Values');title('Bar Chart Example');
```

- Notes:

- `bar(data)` creates a bar chart.
- `set(gca, 'XTickLabel', categories)` assigns custom labels to x-axis.
- Ideal for representing categorical data.



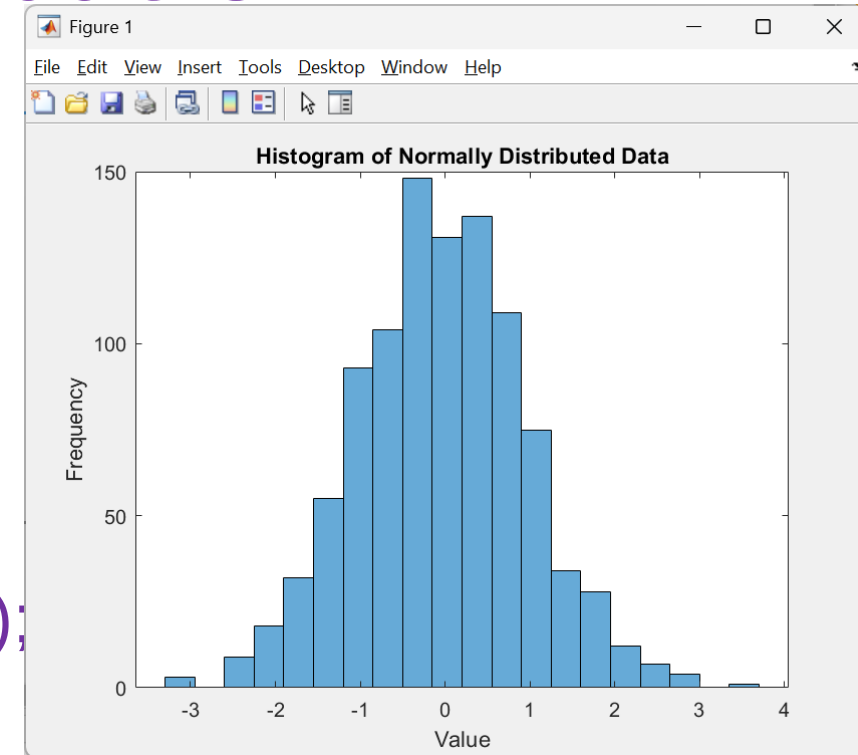
Histograms for Data Distribution

- Code Example:

```
data = randn(1, 1000);  
histogram(data, 20);  
xlabel('Value');  
ylabel('Frequency');  
title('Histogram of Normally Distributed Data');
```

- Notes:

- histogram(data, 20) creates a histogram with 20 bins.
- Useful for understanding data distribution and patterns.



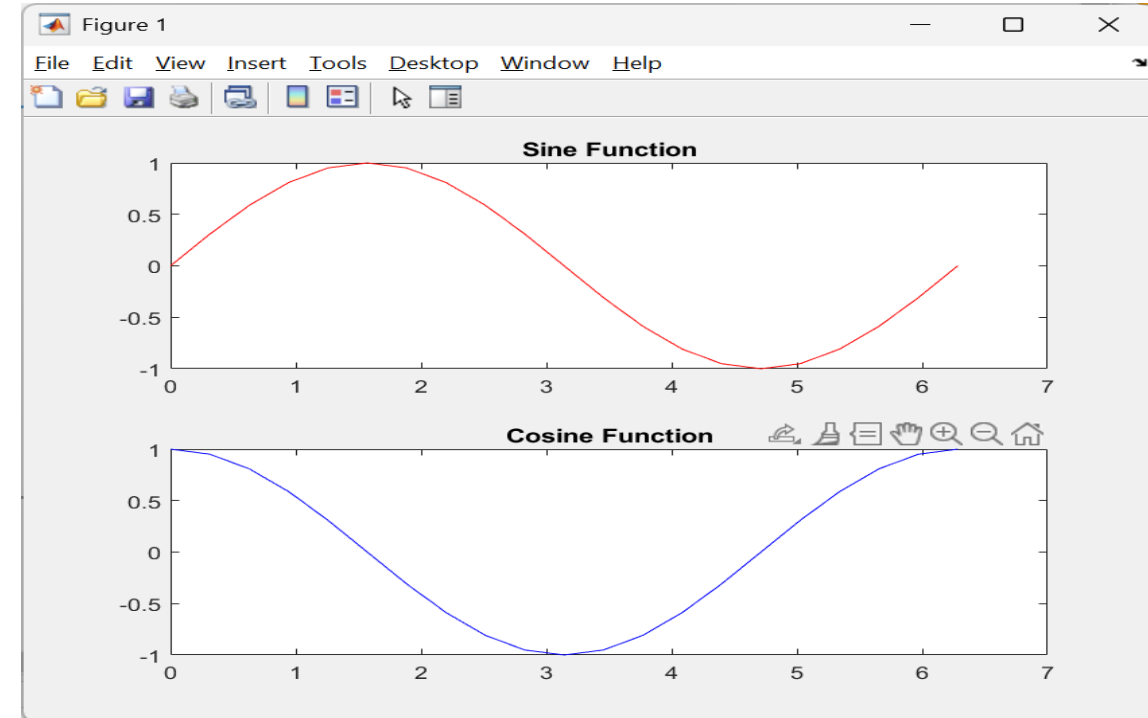
Multiple Plots in One Figure

- Code Example:

```
t = 0:pi/10:2*pi;  
y1 = sin(t);  
y2 = cos(t);  
subplot(2,1,1);plot(t, y1, 'r');  
title('Sine Function');  
subplot(2,1,2);plot(t, y2, 'b');  
title('Cosine Function');
```

- Notes:

- subplot(m, n, p) divides the figure into m rows and n columns.
- The p value selects which subplot to activate.
- Useful for comparing multiple datasets.



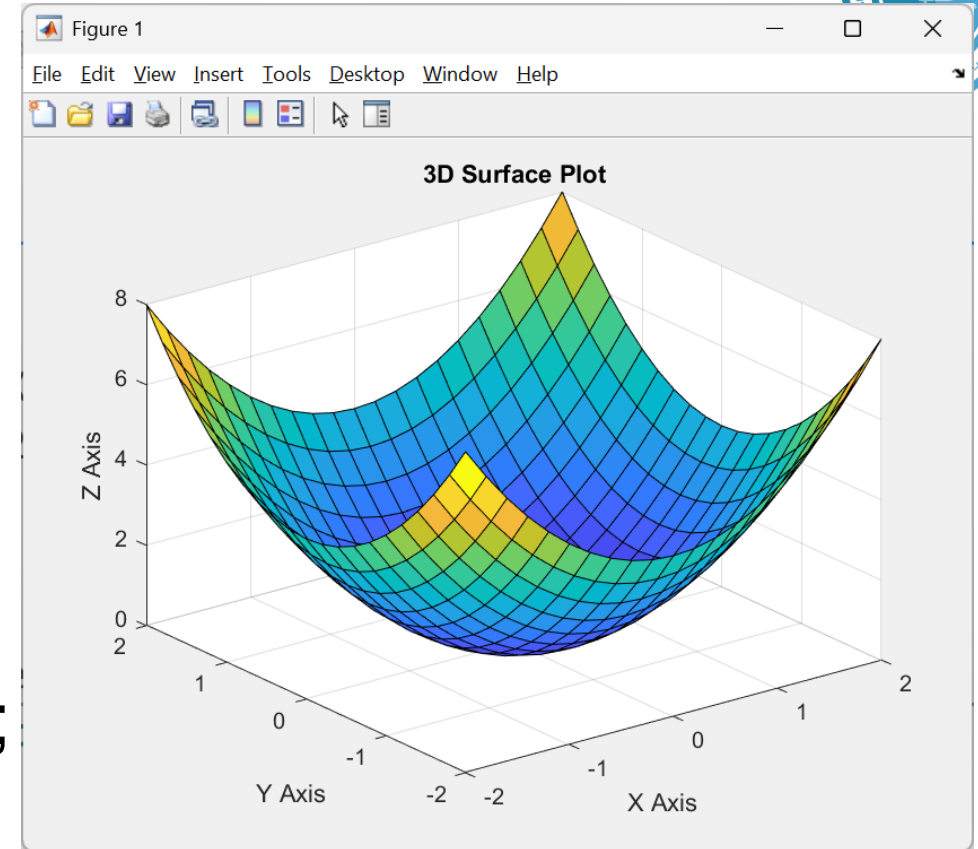
3D Plotting Basics

- Code Example:

```
[x, y] = meshgrid(-2:0.2:2, -2:0.2:2);  
z = x.^2 + y.^2;  
surf(x, y, z);  
xlabel('X Axis');ylabel('Y Axis');  
zlabel('Z Axis');title('3D Surface Plot');
```

- Notes:

- meshgrid generates a grid of x and y values.
- surf(x, y, z) creates a 3D surface plot.
- Useful for visualizing mathematical functions in 3D.





Customizing Plot Styles

- Key Functions:
 - `plot(x, y, 'r--')` (Red dashed line)
 - `scatter(x, y, 'bo')` (Blue circle markers)
 - `bar(data, 'g')` (Green bar chart)
 - `grid on/off` (Enable/Disable grid)
 - `legend('Line 1', 'Line 2')` (Adds a legend)



Figure Props

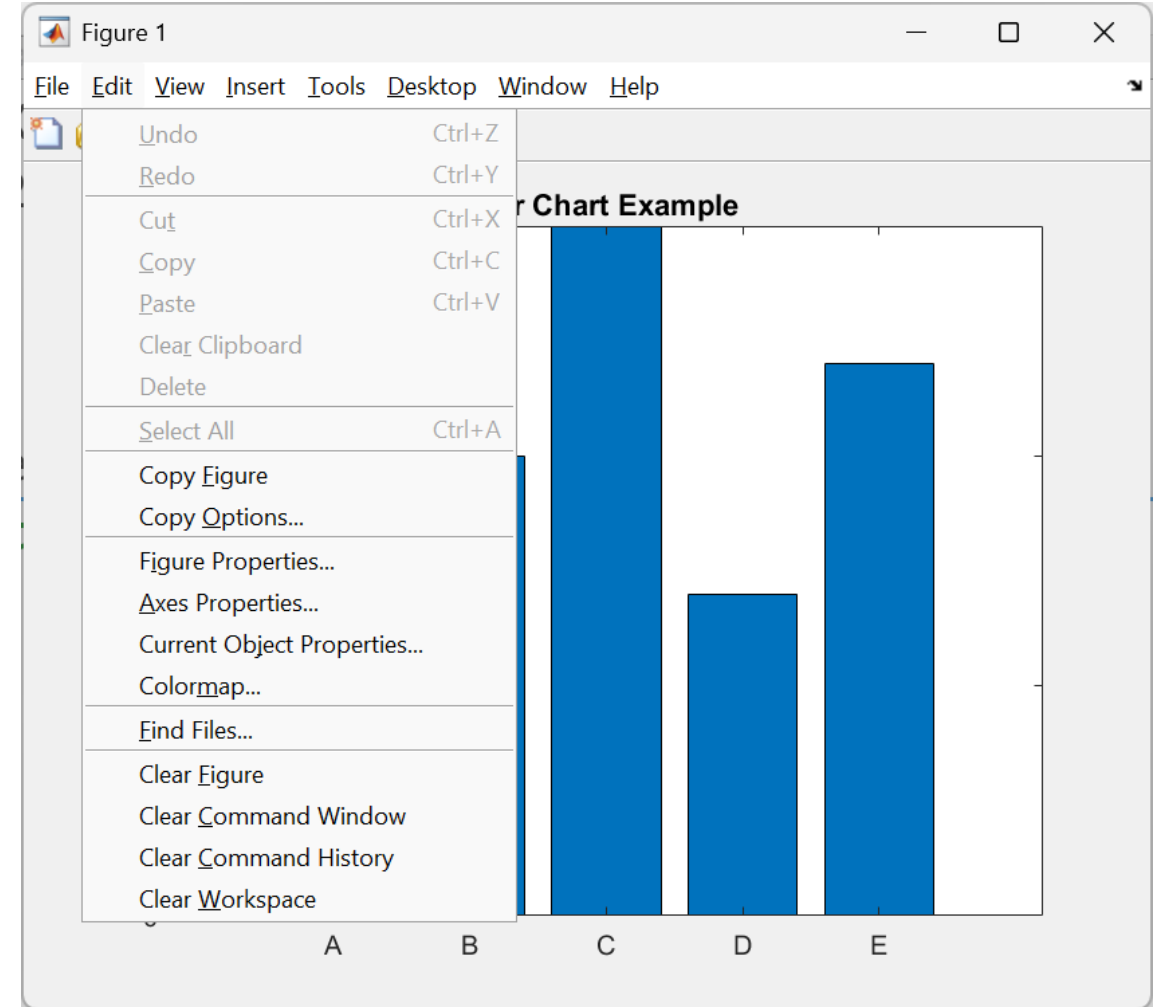
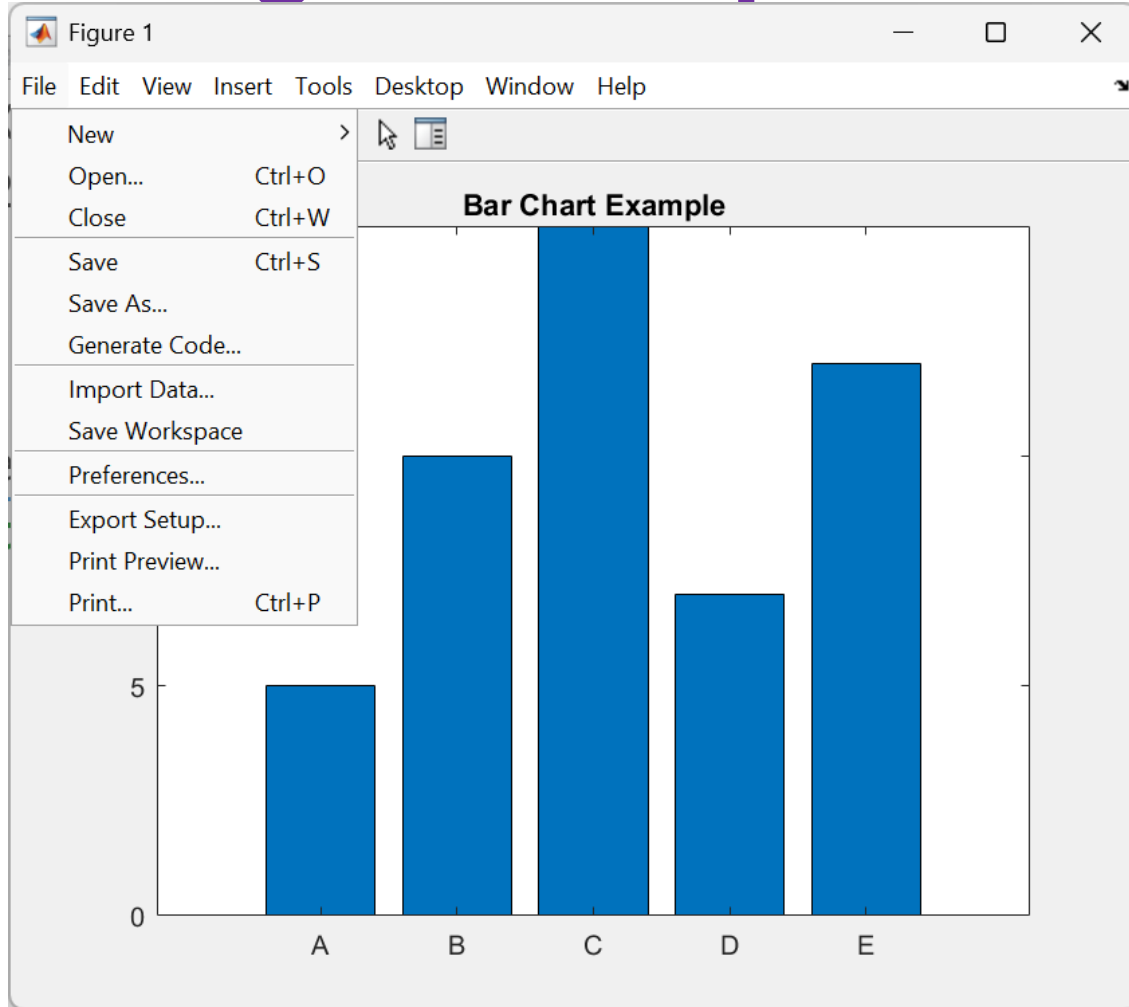


Figure Props

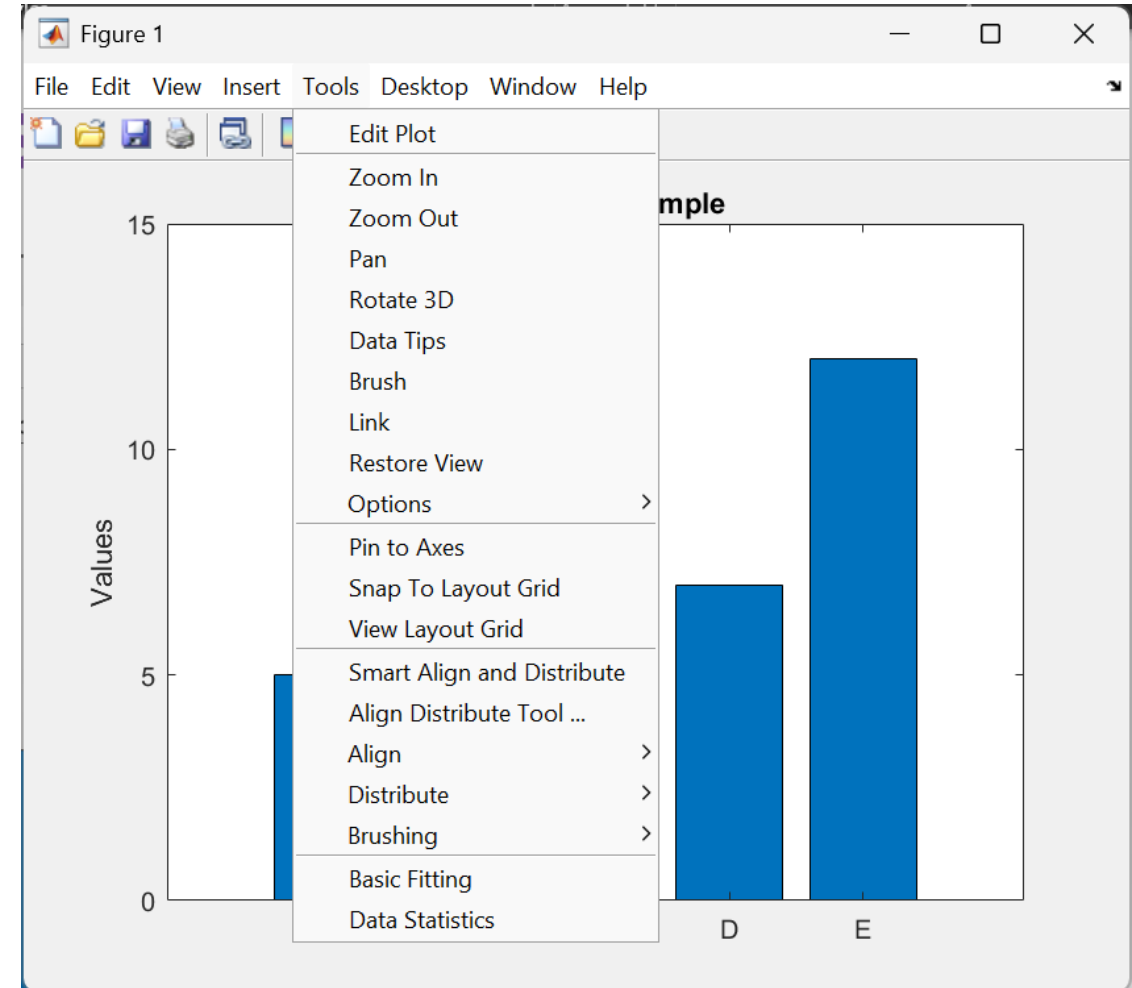
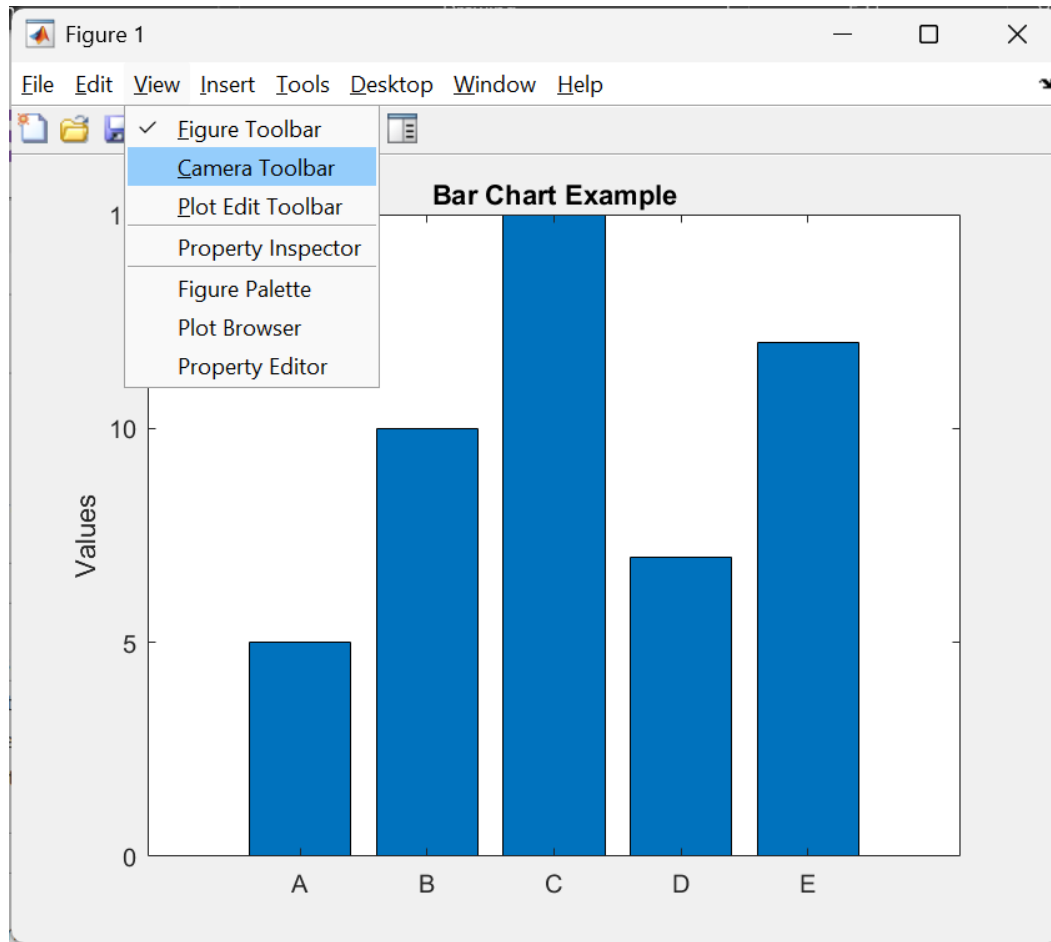




Figure Props

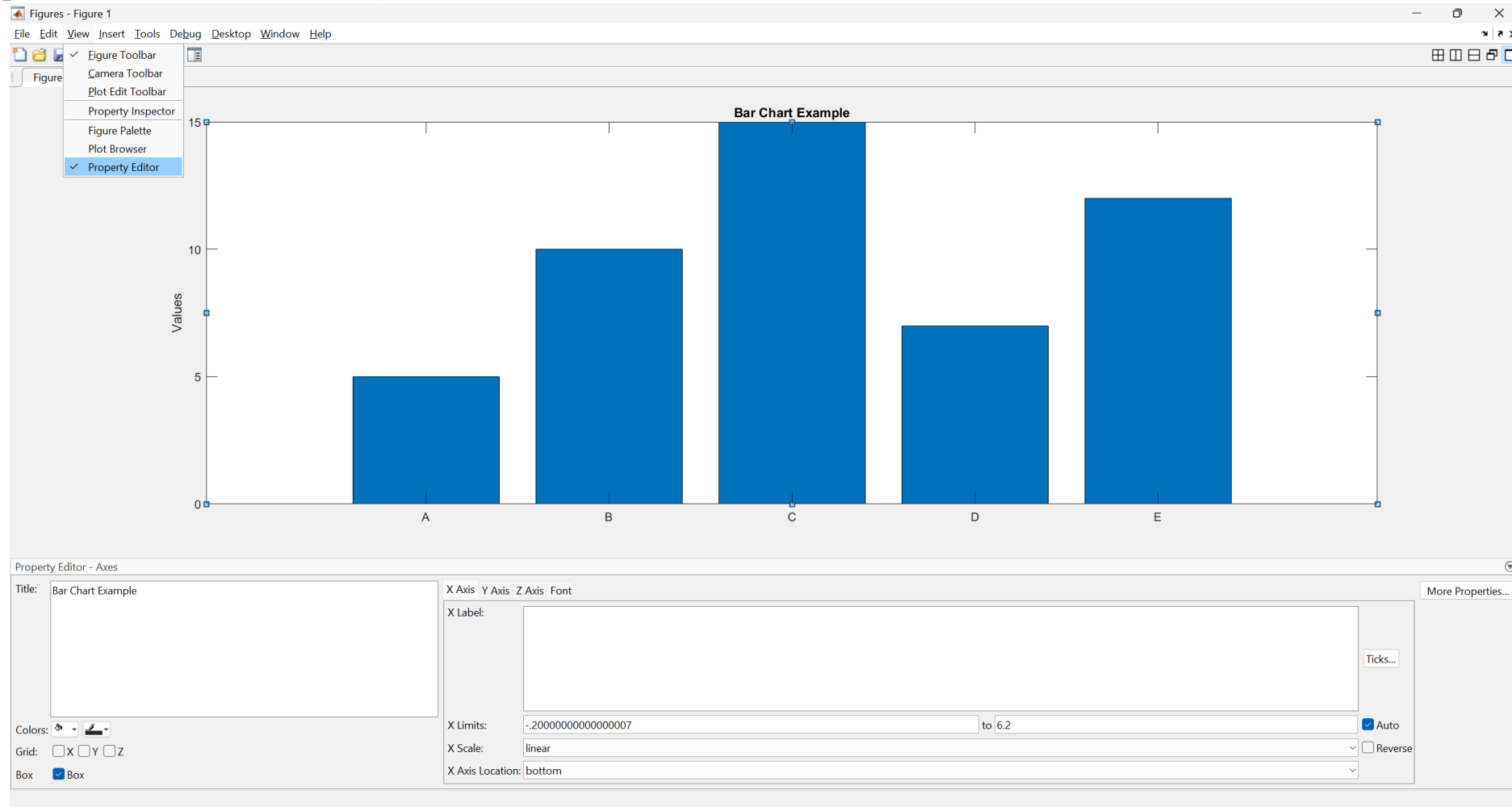
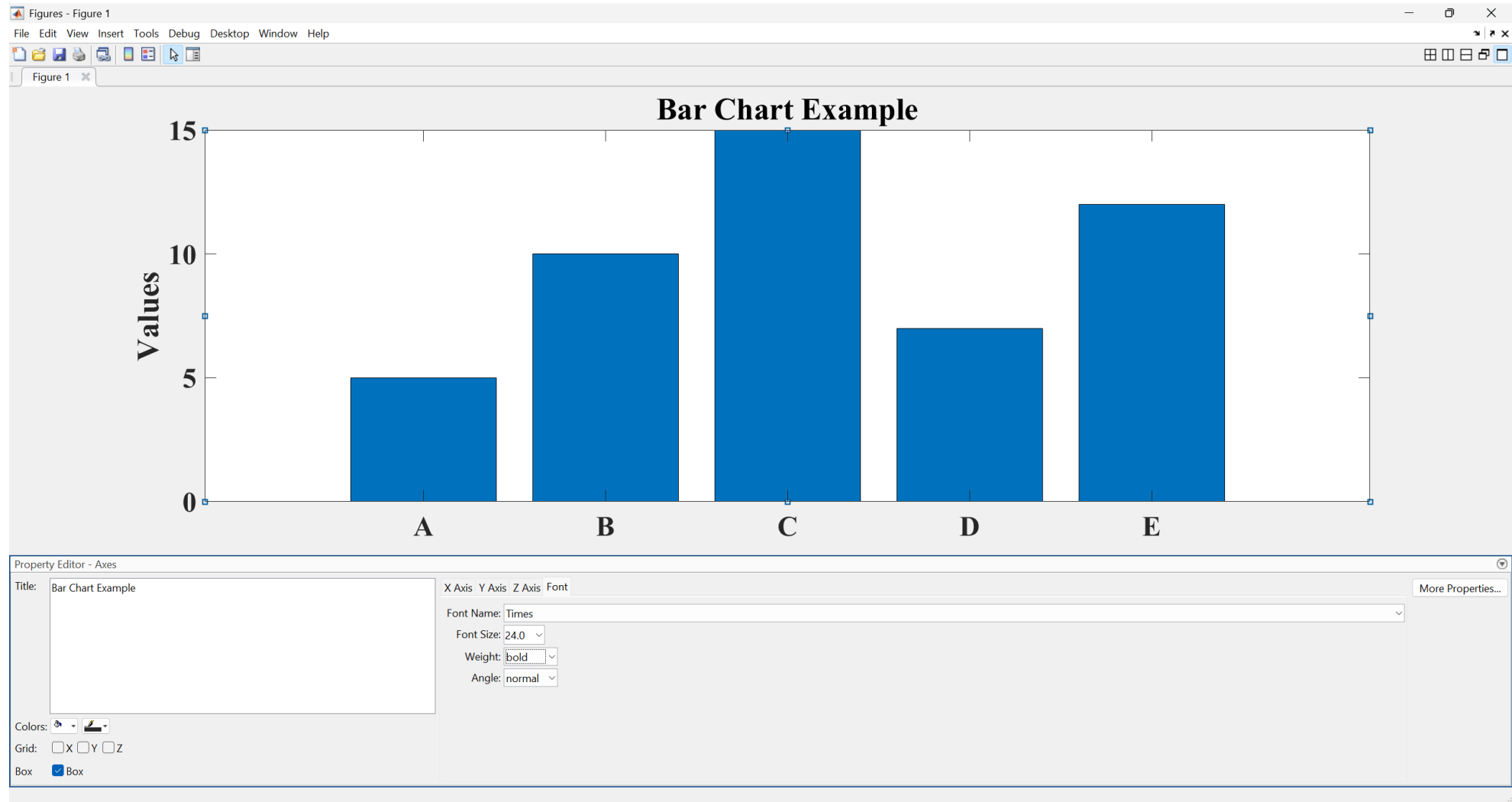




Figure Props





Summary



- Creating line plots, scatter plots, bar charts, histograms, and 3D plots.
- Using subplot for multiple plots.
- Customizing plots with styles, colours, and legends.





Mini Assignment: MATLAB Plotting for Biomedical Engineering



Objective

Use MATLAB to create simple plots related to biomedical engineering.

Tasks

1. Heart Rate Signal (Line Plot)

- Create a simple sine wave to represent a heart rate signal.
- Label the x-axis as "Time (s)" and the y-axis as "Heart Rate Signal".

2. Patient Heart Rate Data (Scatter Plot)

- Generate random heart rate values for 10 patients.
- Create a scatter plot with labeled axes ("Patient ID" and "Heart Rate (bpm)").

3. Blood Pressure Levels (Bar Chart)

- Assume blood pressure readings for 5 patients.
- Create a bar chart with labeled axes ("Patient" and "Blood Pressure (mmHg)").

4. Glucose Level Distribution (Histogram)

- Generate 50 random glucose level values.
- Plot a histogram to show the data distribution.

Submission

- ✓ MATLAB script (.m file) containing all plots.
- ✓ Screenshot of each generated plot.
- ✓ Brief explanation of each plot.
- ✓ **Deadline: 24/03/2025 11:59 PM**

