Plotting in MATLAB

LAB 2
2-D Plots in MATLAB

- Different types of 2-D Plots:
  - Basic line plots:
    ```matlab
    >> plot(x,y)
    ```
  - Stem plots:
    ```matlab
    >> stem(x,y)
    ```
- Other types:
  - bar, area, stairs, loglog etc.
Generating Functions/Signals

- Create independent vector first:
  ```matlab
  >> x=0:0.1:5;
  >> w=linspace(0,2*pi,100);
  ```

- Create dependent vector based on the independent vector:
  ```matlab
  >> y=exp(x+ 2);
  >> v= 4.*cos(w);
  ```

- The length of x and w will be the same as y and v respectively.
The *plot* Command

- Plotting a single variable:
  - \( x \) : row vector of numbers
  - \( \text{plot}(x) \) : plots the values of \( x \) versus the element numbers
  - Element number is on the horizontal axis, and the values in \( x \) on the vertical axis

- Plotting two variables against each other
  - \( x \) and \( y \) : row vectors of the same size
  - \( \text{plot}(x,y) \) : plots the values of \( y \) versus the corresponding values of \( x \)
  - \( x \) is displayed on the horizontal axis and \( y \) on the vertical axis
Plot Options

- Change the line color, marker style and line style by adding a string argument:
  
  ```matlab
  >> plot(x, y, ’r*--’);
  ```

  - `--` changes the line style
  - `r` changes the color
  - `*` changes the marker style

- Plot without connecting the dots by omitting line style argument

- Default: blue continuous line with no markers

- Find the appropriate characters by typing ‘help plot’ in the command window
Figure Properties

- **Changing axis limits**
  
  ```
  >> axis ([x1 x2 y1 y2]);
  >> xlim ([x1 x2]);
  >> ylim ([y1 y2]);
  ```

- **Putting labels**
  
  ```
  >> xlabel('string');
  >> ylabel('string');
  ```

- **Displaying a text inside a plot**
  
  ```
  >> text (x,y,'string');
  ```
Figure Properties - continued

- Creating a plot’s title:
  ```
  >> title('string');
  >> title(['string1', num2str(n), 'string2']);
  ```

- Displaying a grid:
  ```
  >> grid on;
  ```

- Setting the axis limits to the range of the data:
  ```
  >> axis tight;
  ```
Figure Windows

- Plotting multiple functions inside the same window:
  - After plotting the first function type ‘hold on’
  - The previous plot is not erased

- Creating a new figure:

  >>> figure(2) : will open a new figure window, titled ‘Figure 2’. Next commands will affect this window.

- Closing all the open figure windows:

  >>> close all;
Multiple Plots in One Figure

Creating multiple plots inside the same figure window

```python
>> subplot (m,n,p);
```

- m: number of rows
- n: number of columns
- p: plot number
Example

```
>> t = 0:0.01:1;
>> x = sin (2*pi*t);
>> y = sin (4*pi*t);
>> figure (1);
>> plot (t , x , '- b o');
>> hold on;
>> plot (t , y , ': r s');
>> grid on;
>> xlabel ('Time');
>> ylabel ('Amplitude');
>> title ('Plot of Sinusoids');
```