CS 105

Introduction to Scientific Computing

Lecture #6 –Plotting

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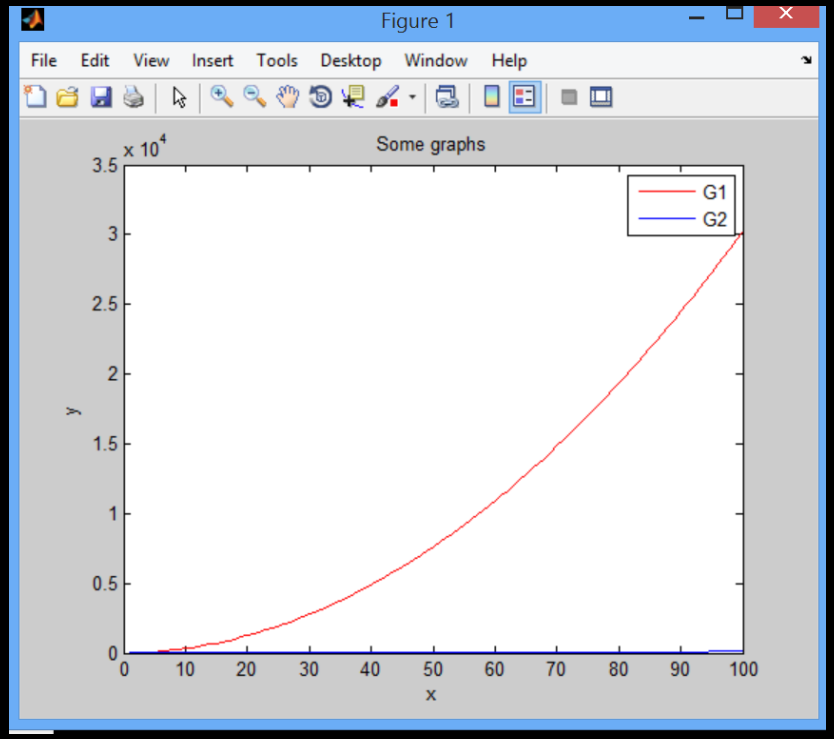
ASSIGNMENT 4

- Graph the equations $y=3x^2+2x+5$ and $y=x+8$ for some range of values of x



NECESSARY SKILLS

- How to plot functions of two variables

TOPICS

1. Plotting in Matlab

READING

- Section 2.11 – Intro to Plotting

PLOTTING IN MATLAB

- MATLAB has several functions that allows us to plot or graph things
  - Given vectors x and y, we can call
    - plot(x,y)
    - plot(x,y,'b')
- We can do other stuff to the plot
  - title('Something')
  - xlabel('Something');
  - ylabel('Something');

PLOTTING IN MATLAB

- We can also specify the plotting *style* in that extra parameter
  - plot(x,y,'-'); %line plot
  - plot(x,y,'--'); %dashed line
- And specify markers
  - plot(x,y,'+'); % put a plus sign at every data point
  - plot(x,y,'o'); % put a circle at every data point
- See more by searching *LineSpec* in the Matlab help

DATA FOR PLOTTING

- Needless to say we must for get the data for plotting
  - 2 vectors
    - X-values, Y-values
- Two ways we can obtain this data are:
  1. Generate it over an interval for an equation
  2. Obtain two vectors "somehow"

PLOTTING EQUATIONS

- Let's say we want to plot the equation $y=x^2$ for $x=1,\ldots,100$
  - How can I create a vectors so that $x=1,\ldots,100$?
  - How can write this equation so that every element of x is squared?

ORGANIZING DATA FOR PLOTTING

The locations in the original data

- Given two vectors, X and Y, we may want to first *sort*
  - [X locs] = sort(X);
  - Y = Y(locs);
- Example:
  - X = [3 5 2 0 1 9]
  - Try plotting just X as is (what would the first parameter in *plot* be?)
  - Try plotting after sorting

ORGANIZING DATA FOR PLOTTING

- Given ordered pair data (nx2 matrix) we can use the *sortrows* function to sort the rows according to a particular column
  - Let's assume our "x data" is in column 1
  - X = sortrows(X,1)
    - Recall, if necessary you can transpose your matrix with X'
- Example:
  - Data = [3 4; 5 0; 0 2; 1 9];

MULTI-PLOTTING

- If we have two sets of data we want to plot we can
  - Generate two different figures
  - Put both plots on the same figure
- Multiple Figures
  - figure(1);
  - plot(x,y);
  - figure(2);
  - plot(x2,y2);
- Multiple Plots
  - figure(1);
  - hold on;
  - plot(x,y,'r');
  - plot(x2,y2,'b');
  - legend('Plot 1', 'Plot 2');
  - hold off;