Previous Lecture:
- 1-d array—vector
- Easy plots in MATLAB

Today’s Lecture:
- Easy plots in MATLAB
- Array of characters—string

Reading:
- CFile: Chapter 5 Sec 5.2

Example 3: Take a hike!
- Write a function randomWalk to perform \( n \) steps of random walk:
  \[
  \text{function randomWalk}(n,x0,y0)
  \]
- Display the walk

Drawing plots
- \( a = [0 \ 3 \ 4] \);
- \( b = [1 \ 5 \ 2] \);
- \( \text{plot}(a,b,'-*') \)

Drawing plots
- \( \text{plot}(a,b,'-',c,d,'*') \)
  - draws 2 graphs: \( a \) vs \( b \) as a line and \( c \) vs \( d \) as asterisks. The pair of vectors storing the x- and y-values must have the same length.

Drawing plots
- To add a title and x- and y-axis label, use the menus on the figure window or use the following commands:
  \[
  \text{title('your plot title')}
  \text{xlabel('name of x-axis')}
  \text{ylabel('name of y-axis')}
  \]
- Use Matlab’s help facility to learn more!

Characters
- A word is made up of letters
- A sentence is made up of letters, punctuation marks, blanks, even digits. It is an array of characters.
- The character array 'CS100M rocks!' is of length 13, has 8 letters, 3 digits, 1 blank, and 1 symbol.
- Use single quotes to enclose characters:
  - '100' is a (character) vector of length 3
  - 100 is a numeric value
Characters
Use single quotes to enclose characters:
- '100' is a character array of length 3
- 100 is a numeric value
- 'pi' is a character array of length 2
- pi is the built-in constant 3.1416...
- 'x' is a character (array of length 1)
- x may be a variable name in your program

Some useful string functions
str= 'Cs 100';
isletter(str) %[1 1 0 0 0 0]
isspace(str) %[0 0 1 0 0 0]
lower(str) %'cs 100'
upper(str) %'CS 100'
ischar(str) %is str a char
array? Answer is 1

Example
Write a function to capitalize the 1st letter of each word in a string. Assume that the string has lower case letters and blanks only.
function [str, nCaps] = caps(str)
% Post: Capitalize 1st ltr of each word.
% str= partially capitalized string
% nCaps= no. of capital letters
% Pre: str= string with lower case ltrs & blanks only

ASCII characters
<table>
<thead>
<tr>
<th>ascii code</th>
<th>Character</th>
</tr>
</thead>
<tbody>
<tr>
<td>65</td>
<td>'A'</td>
</tr>
<tr>
<td>66</td>
<td>'B'</td>
</tr>
<tr>
<td>67</td>
<td>'C'</td>
</tr>
<tr>
<td>90</td>
<td>'Z'</td>
</tr>
</tbody>
</table>

Character vs ASCII code
str = 'Age 19'
%a1-d array of characters
code= double(str)
%convert chars to ascii values
str1= char(code)
%convert ascii values to chars

Arithmetic with characters
- You can “do math” with characters!
- 'c'-'a' gives 2
- '6'-'5' gives 1
- letter1='e'; letter2='f';
  letter1-letter2 gives -1
- 'c'>'a' gives true
- letter1==letter2 gives false
Example: toUpperCase
Write a function `toUpperCase(cha)` to convert character `cha` to upper case if `cha` is a lower case letter. Return the converted letter. If `cha` is not a lower case letter, simply return the character `cha`.

Do not use Matlab's function `upper`!

Example: search in a DNA strand
Write a function to find the number of occurrences of a specific pattern in a DNA string. E.g. ‘agt’ occurs 2 times in ‘gcagttacagt’

```
function n = countPattern(pat, str)
% Post: n= no. of times pat appears in str
% Pre: 1<=length(pat)<=length(str)
```