Announcements:
- Prelim 1 tonight! 7:30-9pm
- A-F: UP B7
- G-O: PH 101
- P-Z: KB 11
- Should you write comments on the exam? YES! (brief comments only)
- Evaluate your TA on-line!

Previous Lecture:
- 1-d array—vector

Today's Lecture:
- More examples on vectors
- Easy plots in MATLAB
- Random integers
- 1-d array of characters

Example 3: Take a hike!
- Write a function randomWalk to perform n steps of random walk starting from (x0,y0):
  
  ```matlab
  function randomWalk(n,x0,y0)
  ```
- At every step, the possible movements are left, right, up, or down
- Display the walk

Random integer numbers
- Which expression generates an integer in (1..6) with equal likelihood?
  
  ```matlab
  round(rand*6)
  ```
  ```matlab
  ceil(rand*6)
  ```

Drawing plots
- a= [0 3 4];
- b= [1 5 2];
- ```matlab
  plot(a,b,'-*')
  ```
Drawing plots

Draw multiple graphs in the same plot by specifying additional pairs of vectors as arguments in function `plot`. Let `a`, `b`, `c`, `d` be vectors, then

```
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:

```
title('your plot title')
xlabel('name of x-axis')
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
  - `'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
```
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’

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