CS30 Spring 2015
Lab 4

Use the command `diary` to record your answers and submit them. Submit code for the scripts and functions you write. Submit any figures.

1. (30 points) 2D array construction and indexing. Consider the following 2D array.

```
my2DArray =

    1    2    3    4    5    6    7    8    9   10
   11   12   13   14   15   16   17   18   19   20
   21   22   23   24   25   26   27   28   29   30
   31   32   33   34   35   36   37   38   39   40
   41   42   43   44   45   46   47   48   49   50
   51   52   53   54   55   56   57   58   59   60
   61   62   63   64   65   66   67   68   69   70
   71   72   73   74   75   76   77   78   79   80
   81   82   83   84   85   86   87   88   89   90
   91   92   93   94   95   96   97   98   99  100
```

(a) Which element is at index (5,2)?

(b) Which element is at linear index 24?

(c) Construct `my2DArray` as given, making use of the double colon operator.

(d) Access the fifth column of `my2DArray`.

(e) Access the first row of `my2DArray`.

(f) Access the 3×3 submatrix of `my2DArray` consisting of the elements in rows 2, 3, and 4, and columns 6, 7, and 8.

(g) Access the 5×5 submatrix of `my2DArray` consisting of the elements in even rows and odd columns.

2. (35 points) String parsing and manipulation.

  (a) How do the results of these two statements differ?

```
>> strcat('this ', 'is ', 'a' ,'   test')
>> ['this ', 'is ', 'a' ,'   test']
```

  (b) How would you replace every occurrence of the word `apple` with the word `orange` in the sentence `'I like apples.'`?

  (c) Modify the function `DisplayWords` in Example 6.4.1 to to output an array containing the words in the input sentence. Use the function `char` to construct your output array. Call your function `GetWords`. Run your function on the following input.

```
>> GetWords('Hello, how are you?')
ans =
Hello,
how
are
you?
>> GetWords('This is a test.')
ans =
This
is
a
test.
```

  (d) Write a function `CleanSentence` which takes as input a sentence and returns as output the sentence cleaned up. In particular, there should be no leading or trailing whitespace, and only the first letter of the sentence should be capitalized. Run your function on the following input.

```
>> ['***',CleanSentence('   hello, how are you?'),'****']
ans =
***Hello, how are you?****
>> ['***',CleanSentence(' This is a test.          '),'****']
ans =
***This is a test.****
```
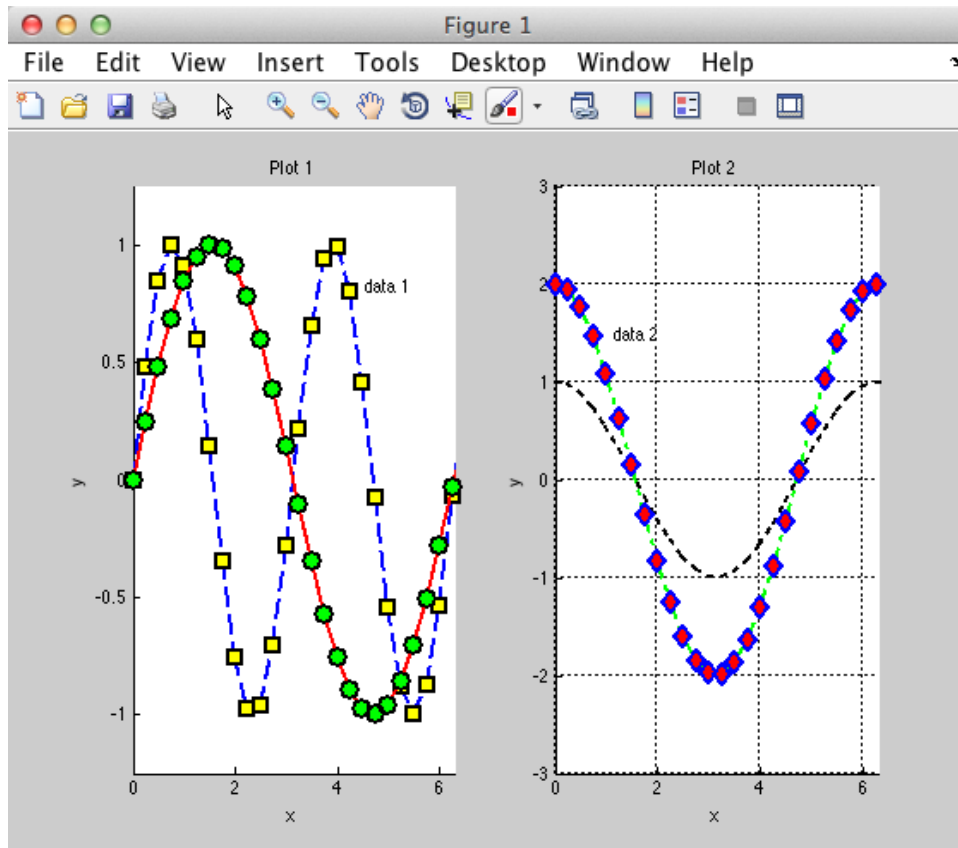
3. (35 points) 2D Plotting. Write a script called `MakePlot` to create a plot like the one shown below. Reproduce the features of the plot, such as titles, axis labels, axis limits, line and marker styles, and data point labels, and the grid. Read the data in from the file 'datafile.mat'. The x-values are stored in variable `x`, and the y-values are stored in variables `y1`, `y2`, `y3`, and `y4`. Save your figure to a file `myFigure.fig`.