ME 190 Lab 1- MatLab Refresher and Data Handling

Table of Contents

Justin Garcia 9/2/2016 Lab Section 4

Summary

In this lab my partner and I learned to use the bbasic functions of MatLab to create vectors and matrices and manipulate their contents. We also used the linspace and logspace commands to create large vectors with regular spacing. This lab was also an opportunity to learn how to create basic scripts and generating a lab report using the publish feature. My partner and I also learned how to read in data from Microsoft Excel and how to plot data and create graphs that overlapped and had different line representations. In order to accomplish the tasks, we used the handouts that were referred to in the lab manual as well as the resources provided by MatLab online to correctly enter commands into the console. I am happy with the instruction provided by this lab and learned how to use the basic elements of MatLab. The power of the software makes me want to learn more.

```
%-------------------------------------------------------------------------
```

Exercise 1 - Matrix Generation and Manipulation

```
B = 5:13
C = 13:-1:5
D = B.*C
E = [B(1:3),C(4:6),D(7:9)]
F = [B(1:3);C(4:6);D(7:9)]
G = [linspace(10,100,10);logspace(1,2,10)]
%-------------------------------------------------------------------------
```

```
B =

     5     6     7     8     9    10    11    12    13
```

```
C =

    13    12    11    10     9     8     7     6     5


D =

    65    72    77    80    81    80    77    72    65


E =

     5     6     7    10     9     8    77    72    65


F =

     5     6     7
    10     9     8
    77    72    65


G =

  Columns 1 through 7

   10.0000   20.0000   30.0000   40.0000   50.0000   60.0000   70.0000
   10.0000   12.9155   16.6810   21.5443   27.8256   35.9381   46.4159

  Columns 8 through 10

   80.0000   90.0000  100.0000
   59.9484   77.4264  100.0000
```

Exercise 2 - Simple Indexing

```
x = -100:100;
y = x.^3 + 60*x.^2 -50;

miny = min(y)
maxy = max(y)

negmaxy = max(y(y<0))
posminy = min(y(y>0))

indexnegmaxy = find(y== -50)
indexposminy = find(y == 9)

firstindexpos = find(y > 0,1)
firstposy = y(42)
```

```
yzero2thousand = find(y>0 & y<1000)
valyzero2thousand = y(yzero2thousand)
%-------------------------------------------------------------------------
```

```
miny =

     -400050
```

```
maxy =

     1599950
```

```
negmaxy =

   -50
```

```
posminy =

     9
```

```
indexnegmaxy =

    41   101
```

```
indexposminy =

   100
```

```
firstindexpos =

    42
```

```
firstposy =

        3431
```

```
yzero2thousand =

    97    98    99   100   102   103   104   105
```

```
valyzero2thousand =

   846   463   182     9    11   198   517   974
```

Exercise 3 - Multiplication Table

Part A - Times Table

table size

```
row=5
col=5

x2 = 1:col
y2 = (1:row)'
z = y2*x2

% generate table and output
table = z

zmiddle = z(2:end-1,2:end-1)
zvector = zmiddle(:)
zsum = sum(zvector)
```

```
row =

     5


col =

     5


x2 =

     1     2     3     4     5


y2 =

     1
     2
     3
     4
     5


z =

     1     2     3     4     5
     2     4     6     8    10
     3     6     9    12    15
     4     8    12    16    20
```

```
     5    10    15    20    25


table =

     1     2     3     4     5
     2     4     6     8    10
     3     6     9    12    15
     4     8    12    16    20
     5    10    15    20    25


zmiddle =

     4     6     8
     6     9    12
     8    12    16


zvector =

     4
     6
     8
     6
     9
    12
     8
    12
    16


zsum =

    81
```

Part - B

```
row2 = 6
col2 = 7

x3 = 1:col2
y3 = (1:row2)'
z2 = y3*x3

table67 = z2
zmiddle2 = z2(2:end-1,2:end-1)
zvector67 = zmiddle2(:)
zsum67 = sum(zvector67)


row2 =
```

```
     6


col2 =

     7


x3 =

     1     2     3     4     5     6     7


y3 =

     1
     2
     3
     4
     5
     6


z2 =

     1     2     3     4     5     6     7
     2     4     6     8    10    12    14
     3     6     9    12    15    18    21
     4     8    12    16    20    24    28
     5    10    15    20    25    30    35
     6    12    18    24    30    36    42


table67 =

     1     2     3     4     5     6     7
     2     4     6     8    10    12    14
     3     6     9    12    15    18    21
     4     8    12    16    20    24    28
     5    10    15    20    25    30    35
     6    12    18    24    30    36    42


zmiddle2 =

     4     6     8    10    12
     6     9    12    15    18
     8    12    16    20    24
    10    15    20    25    30


zvector67 =
```

```
     4
     6
     8
    10
     6
     9
    12
    15
     8
    12
    16
    20
    10
    15
    20
    25
    12
    18
    24
    30


zsum67 =

   280
```

Part - C

```
row3 = 10
col3 = 10

x4 = 1:col3
y4 = (1:row3)'
z3 = y4*x4

table10 = z3
vector10x10 = table10(:)
vector10x10 = find(vector10x10 > 20 & vector10x10 < 70)
size(vector10x10)
%--------------------------------------------------------------------------


row3 =

    10


col3 =

    10
```

```
x4 =

     1     2     3     4     5     6     7     8     9    10


y4 =

     1
     2
     3
     4
     5
     6
     7
     8
     9
    10


z3 =

     1     2     3     4     5     6     7     8     9    10
     2     4     6     8    10    12    14    16    18    20
     3     6     9    12    15    18    21    24    27    30
     4     8    12    16    20    24    28    32    36    40
     5    10    15    20    25    30    35    40    45    50
     6    12    18    24    30    36    42    48    54    60
     7    14    21    28    35    42    49    56    63    70
     8    16    24    32    40    48    56    64    72    80
     9    18    27    36    45    54    63    72    81    90
    10    20    30    40    50    60    70    80    90   100


table10 =

     1     2     3     4     5     6     7     8     9    10
     2     4     6     8    10    12    14    16    18    20
     3     6     9    12    15    18    21    24    27    30
     4     8    12    16    20    24    28    32    36    40
     5    10    15    20    25    30    35    40    45    50
     6    12    18    24    30    36    42    48    54    60
     7    14    21    28    35    42    49    56    63    70
     8    16    24    32    40    48    56    64    72    80
     9    18    27    36    45    54    63    72    81    90
    10    20    30    40    50    60    70    80    90   100


vector10x10 =

     1
     2
     3
     4
     5
```

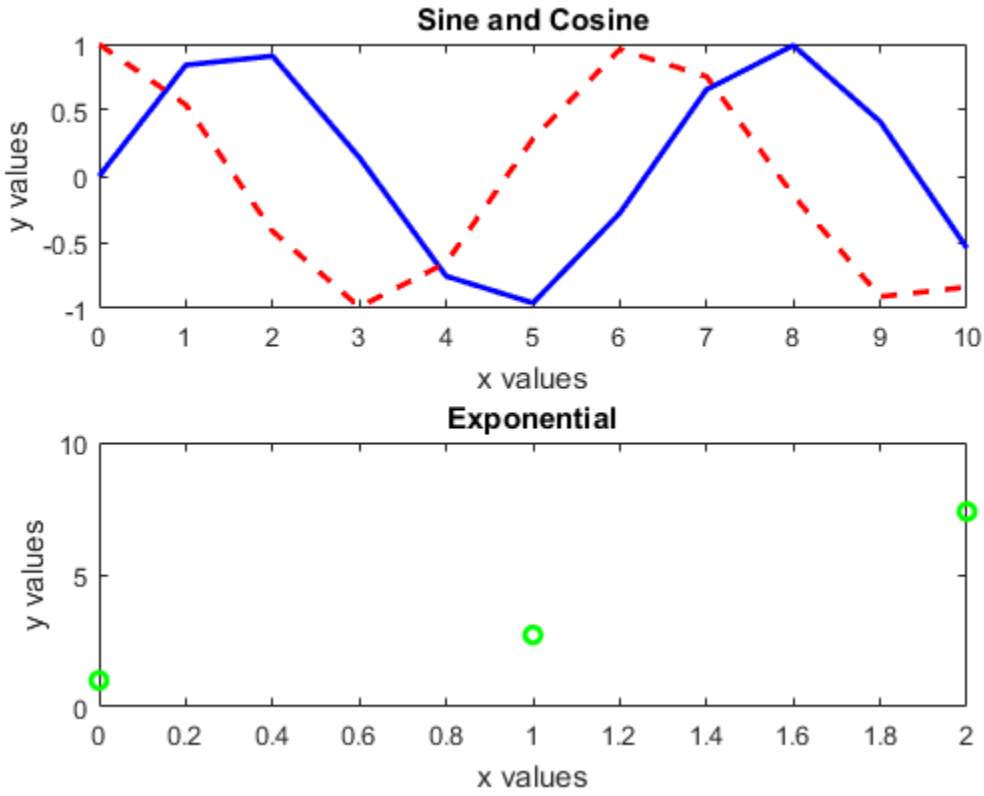
```
 6
 7
 8
 9
10
 2
 4
 6
 8
10
12
14
16
18
20
 3
 6
 9
12
15
18
21
24
27
30
 4
 8
12
16
20
24
28
32
36
40
 5
10
15
20
25
30
35
40
45
50
 6
12
18
24
30
36
42
48
54
```

```
    60
     7
    14
    21
    28
    35
    42
    49
    56
    63
    70
     8
    16
    24
    32
    40
    48
    56
    64
    72
    80
     9
    18
    27
    36
    45
    54
    63
    72
    81
    90
    10
    20
    30
    40
    50
    60
    70
    80
    90
   100


vector10x10 =

    27
    28
    29
    30
    36
    37
    38
    39
    40
```

```
    45
    46
    47
    48
    49
    50
    54
    55
    56
    57
    58
    59
    60
    63
    64
    65
    66
    67
    68
    69
    73
    74
    75
    76
    77
    78
    83
    84
    85
    86
    87
    93
    94
    95
    96


ans =

    44     1
```

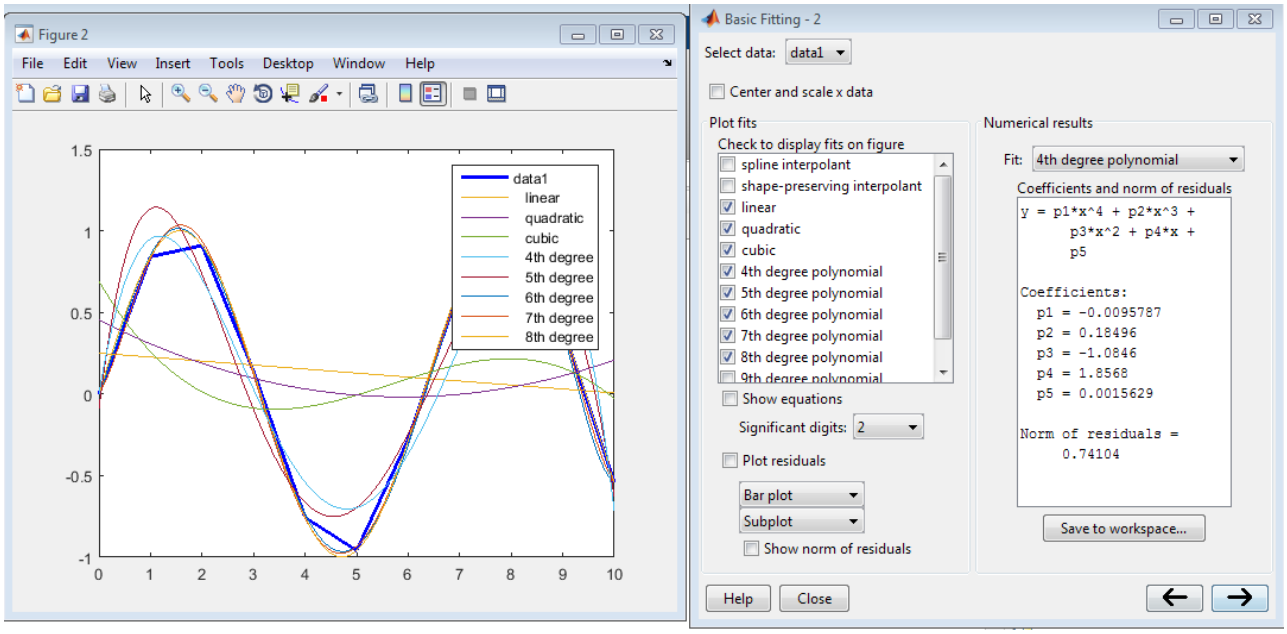
Problem 4

```
A = xlsread('Lab1Excel.xlsx');

figure(1);
ax1 = subplot(2,1,1);
sin = plot(A(:,1),A(:,2),'b','LineWidth',2);
hold on;
cos = plot(A(:,1),A(:,3),'--r','LineWidth',2);
title('Sine and Cosine');
xlabel('x values');


ylabel('y values'); ax2 = subplot(2,1,2);
exp =
plot(A(:,1),A(:,4),'og','LineWidth',2);
axis(ax2,[0 2 0 10]);
title('Exponenti
al'); xlabel('x
values');
ylabel('y
values');
%-------------------------------------------------------------------
-----
```



Problem 5

```
A =
xlsread('Lab1Excel.xlsx')
; figure(2);
sin2 =
plot(A(:,1),A(:,2),'b','LineWidth',2);
axis(sin2, [0 10 -1 1]);
% 6th order polynomial is the lowest polynomial order that
provides a
% reasonable fit

axis(sin2, [0 10 -1 1]);
```



Published with MATLAB® R2016a