Lab 1 for Math 398 Section 952: Basic Matlab, Numbers, Matrices and Objects

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This document constitutes your first lab assignment, which will be largely worked in the lab session. It will draw on material from Lectures 1 and 2, so it would be a good idea to go to my Home Page (http://www.math.unl.edu/~tshores/) and thence to my Teaching Page, thence to the Math398 Section 952 Home Page. Really, it would be a good idea to bookmark the class home page.

The first issue to be dealt with is how to do these lab assignments. You will need to open a Matlab session and have this pdf file open for reading as well. To keep a recording of your work, you issue the following command to Matlab

```
> diary 'myfile'
```

Matlab will then send a copy of all your typed input and the output to a file called 'myfile.' For clarity, use descriptive names for your files, such as 'jsmithasgn1' so that when I save the files that you will email me, I can tell what it's about by the title. If at any point you want to stop the diary feature, issue the command

```
> diary off
```

To resume the diary feature, simply type

```
> diary on
```

This will cause input to be appended to myfile. You can make comments in your homework file by typing % at the command line and this too will be recorded. For example

```
> % This is a comment.
```

Be sure to start your file with the comments

```
> % Name:  yourname
> % Email:  your email addresss
```

When you end your session, the file will be closed and you can view it and even edit it with a text editor. As a matter of fact, you can even edit and view it with the Matlab Editor. Just type

```
> edit myfile
```

When you have finished the assignment, email the file to me as an attachment. My email address is `tshores@math.unl.edu`. Here is the assignment.

Problems

1. You are given parametric equations $x(t) = \sin(t)\exp(\cos(t))$, $y(t) = \cos(t)\exp(\sin(t))$. These equations define a periodic curve in the xy-plane.

(a) Evaluate these functions at $t = 0, \pi/2$ and π.
(b) Create a vector t of 20 equally spaced points from 0 to 2π.
(c) Create vectors $x(t), y(t)$.
(d) Do a plot of x and y versus t.
(e) Do a parametric plot of the curve by converting the vectors x, y into a single complex vector $z = x + i * y$ and plotting the single vector. Close the preceding plot first.

2. Finish carrying out the commands in Matlab Lecture 2, starting with the matrix constructions section. When you have finished, create one new record and display it.

3. Create a matrix in block form that has 4 2×2 identity matrices down the main diagonal and off the diagonal has only entry 3.

4. Use the vector of values for $x(t), y(t)$ found in problem 1 to represent data. Now smudge the data by a random amount in such a way that the error could be as large as 3%. Then plot the resulting curves along with the true curve as in Exercise 1(d).