Duke University
Edmund T. Pratt, Jr. School of Engineering

EGR 53L Fall 2004

Test I

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Name (please print)_____

In keeping with the Community Standard, I have neither provided nor received any assistance on this test. I understand if it is later determined that I gave or received assistance, I will be brought before the Undergraduate Judicial Board and, if found responsible for academic dishonesty or academic contempt, fail the class. I also understand that I am not allowed to speak to anyone except the instructor about any aspect of this test until the instructor announces it is allowed. I understand if it is later determined that I did speak to another person about the test before the instructor said it was allowed, I will be brought before the Undergraduate Judicial Board and, if found responsible for academic dishonesty or academic contempt, fail the class.

Signature:_____

Problem I: [15 pts.] Basic Programming

Given the following equation:

$$x = \frac{\ln(a) + \cos(\theta) + (ab)^2}{2a}$$

where a, b, and θ are input variables with θ in degrees, write a Matlab script to obtain values for a, b, and θ from the user then calculate and display x.

Note: The equation is undefined if a is equal to zero. Therefore, if the value of a falls within the range -eps $< a <$ eps, where eps is the built-in Matlab variable, the program should not calculate the value of x and instead output the message, "x cannot be calculated"

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Problem II: [20 pts.] Matrix Creation and Manipulation

For each of the following sections, write the Matlab command required or answer the question:

(a) Create a matrix named `mat` with the following elements:

$$\text{mat} = \begin{bmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \end{bmatrix}$$

(b) Starting from `mat`, create a new matrix named `doublerow2` which is identical to `mat` except that the elements of the 2nd row have been multiplied by 2. That is:

$$\text{doublerow2} = \begin{bmatrix} 1 & 2 & 3 \\ 8 & 10 & 12 \end{bmatrix}$$

You *must* generate this by manipulating the `mat` matrix.

(c) What is the result of the following command?

```
answer = 2 + mat(3, 3)
```

(d) Create `newmat` from `mat`. `newmat` is a 5x5 matrix identical to `mat` but with zeros in the extra elements.

$$\text{newmat} = \begin{bmatrix} 1 & 2 & 3 & 0 & 0 \\ 4 & 5 & 6 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 \end{bmatrix}$$

Again, you *must* generate this by manipulating the `mat` matrix.

(e) Starting from `newmat` above, write the command to create `nextmat`.

$$\text{nextmat} = \begin{bmatrix} 1 & 2 & 3 & 0 \\ 4 & 5 & 6 & 0 \\ 0 & 0 & 0 & 0 \end{bmatrix}$$

This time, you *must* generate this by manipulating the `newmat` matrix.

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Problem III: [15 pts.] UNIX

For the first task below, assume that you have just logged into a UNIX station and just started a terminal window. For each successive line, assume the lines above it have already been completed.

(a) Create a directory called `MyStuff` in your home directory

(b) Change into your `MyStuff` directory - the rest of the commands below assume you are in your `MyStuff` directory.

(c) Create a directory called `labs` in your `MyStuff` directory

(d) Create a directory called `backoops` in your `MyStuff` directory

(e) Copy all files from Dr. G's ~`mrg/public/Etest` directory into your `labs` directory

(f) Delete all files ending in `.jnk` from your `labs` directory

(g) Rename your `backoops` directory to `backups`

(h) Move all files that end in `.back` from your `labs` directory to your `backups` directory

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Problem IV: [15 pts.] Relational Operators

Given the following Matlab commands:

```
A = [1 2 3 4 5]
B = [3 1 4 1 5]
```

Show what each variable below will become. For purposes of earning partial credit in the event of an incorrect response, you may also choose to write a brief description of what is happening in each command.

(a) C = A>B

(b) D = (A-B)<-1 | (A-B)>1

(c) E = 3<A<5

(d) F = (A~=B) & (B>2)

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Problem V: [20 pts.] MATLAB Interpretation

The following Matlab script, `testit.m`, calls the function `dummy.m`. Please show the output when `testit` is executed.

The contents of the file `testit.m` are:

```
%%%% start of testit.m
A=1;
B=2;
C=3;
D=4;
E=5;

[D, E] = dummy(A, B, C);

disp([A, B, C, D, E])
%%%% end of testit.m
```

The contents of the file `dummy.m` are:

```
%%%% start of dummy.m
function [a,b]=dummy(c, d, e)
c=c+e+1;
d=8.*d;
e=d./2;
a=c;
b=e;
disp([a, b, c, d, e])
%%%% end of dummy.m
```

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Problem VI: [15 pts.] LaTeX Processing

Assuming you have written a file named `Report5.tex`, give the proper UNIX commands needed to:

(a) Process `Report5.tex` using LaTeX to produce a `.dvi` file

(b) Preview the `Report5.dvi` file

(c) Create a PostScript file named `Printable5.ps` from `Report5.dvi`

(d) Preview the `Printable5.ps` file