E7 Midterm Examination 1

Friday October 10, 2008

Name:	
SID:	

Lecture Section: 1   2   (please circle your lecture section)

Lab Section: (please circle your laboratory section)

11 – TuTh 8-10   12 – TuTh 10-12   13 – TuTh 12-2   14 – TuTh 2-4

15 – TuTh 4-6   16 – MW 8-10   17 – MW 10-12   18 – MW2-4

19 – MW 4-6   20 – MW 2-4 (2109)   21 – TuTh 10-12 (2109)

22 – TuTh 12-2 (2109)   23 – TuTh 2-4 (2109)   24 – TuTh 4-6 (2109)

Problem	Points	Grade
1	10	
2	12	
3	20	
4	18	
5	16	
6	9	
7	15	
TOTAL	100	

1. Write your name on each page.
2. Write your answers <u>ONLY</u> on the spaces provided.
3. You may not ask questions during the examination, nor leave the room before the exam ends.
4. Closed book and notes. One 8.5"×11" two-sided sheet of handwritten notes allowed.
5. No calculators, no cell phones, no food or drink. Please turn cell phones off.

1. Suppose the following statements are executed.

```
>> A = [1 4 3 8];
>> B = [0 3 5 ; 1 4 2];
```

Write the results of the following commands. Write "Error" if an error is produced.

(a) >> A(end:-2:1)

(b) >> B(5)

(c) >> B(3,2)

d) >> B([2 1],[3 1])

(e) >> B(:,2)' .^2 + A([3 4]) ./ A([1 2])

2. Suppose the following statements are executed.

```
>> A = [1 4 2 6];
>> B = [2 3 -1 6];
```

Write the results of the following commands. Write "Error" if an error is produced.

(a) >> ~(A==B) | (A==B)

(b) >> A([1,3]) > B(2:3)

(c) >> find(A==B)

(d) >> find((A>=B) & (A<(B*2)))

3. Assume that the following MATLAB command has been executed to create the 2×2 cell array named `Mycell`

```
>> Mycell = {'Good' ,  {'Morning', 5, 'Sunshine'};...
          [3;7], [1 5 ; 2 4]}
```

'Good'	{'Morning', 5, 'Sunshine'}
$\begin{bmatrix} 3 \\ 7 \end{bmatrix}$	$\begin{bmatrix} 1 & 5 \\ 2 & 4 \end{bmatrix}$

Pictorial diagram of `Mycell`

(a) Write the results of the following commands. Write "Error" if an error is produced.

(1) >> `class(Mycell(1,1))`

(2) >> `class(Mycell{1,1})`

(3) >> `class(Mycell{1,2})`

(4) >> `Mycell{1,1}(2)`

(5) >> `Mycell{1,2}{2}`

(continues on next page)

'Good'	{'Morning', 5, 'Sunshine'}
$\begin{bmatrix} 3 \\ 7 \end{bmatrix}$	$\begin{bmatrix} 1 & 5 \\ 2 & 4 \end{bmatrix}$

Pictorial diagram of Mycell

(b)   Write a one-line MATLAB command to create a character array that contains

'Good Morning Sunshine'

from the contents of Mycell.

>>

(c)   Write a one-line MATLAB command that will add a third row of ones to the array contained in the (2,2) element of Mycell

>>

4. The following MATLAB commands are executed to obtain the structure array `Teamdata`:

```
>> Teamdata(1).Team = 'Super'
>> Teamdata(1).Timing = [102, 107]
>> Teamdata(2).Team = 'Fantastic'
>> Teamdata(2).Timing = [100, 101, 99]
```

Write the results of the following commands. Write 'Error' if an error is produced.
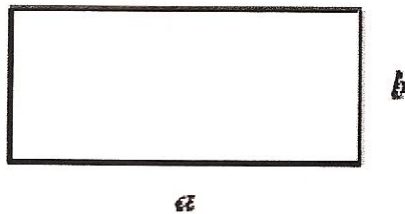
(a) `>> size(Teamdata)`

(b) `>> class(Teamdata(2).Team)`

(c) `>> Teamdata(1).Team(end:-2:1)`
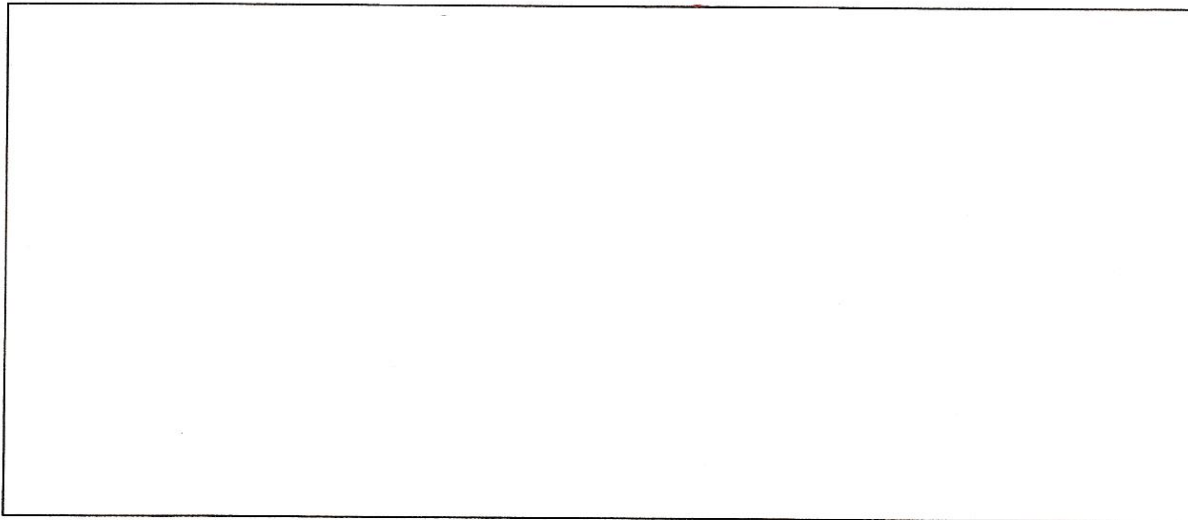
(d) `>> s = [ Teamdata.Team ]`

(e) `>> s(7)`

(f) `>> Teamdata(1).Timing(2)`

5. (a) Given a rectangle pictured below, write a function called `rectangle`, which calculates its area and perimeter length. This function should have a and b as its input arguments and return output arguments `area` and `perimeter`.

M-file `rectangle.m`

(b) Create an anonymous function that computes and returns the sum of the squares of two scalar input arguments of class double.

    >>

6. Given the function my_funct shown below

```
function y = my_funct(x)

if x <= 5
    y = x + 2;
elseif x < 12
    y = x - 2;
else
    y = x / 2;
end
```

write the results of the following commands. Write "Error" if an error is produced.

(a) >> my_funct(3)

(b) >> my_funct(10)

(c) >> my_funct(26)

7. (a) The function `min_dist` shown below determines the minimum value of

$$D(x) = \sqrt{f^2(x) + x^2} \qquad \text{in the range} \qquad a < x < b$$

where $f(x)$ is a user-defined function. `min_dist` utilizes the MATLAB function `fminbnd` (see syntax below)[1].

Complete the incomplete line of code in function `min_dist`.

```
function D = min_dist(fh,a,b)
% fh is the handle to a single-valued vectorized function
% a < x < b



Dh =



[xmin, D]  = fminbnd(Dh,a,b);
```

(b) Write a command that uses the function `min_dist` to compute the minimum value of $D(x)$ defined above, when a = -3, b = 3, and the function $f(x)$ is defined by the vectorized function `my_fun`, which is stored in the M-file `my_fun.m`.

>>

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[1] `[xmin,fmin]  = fminbnd(fh,a,b)`
`xmin` is a minimizer of a single-valued **vectorized** function with handle `fh`
in the interval $a < x < b$.
`fmin  = fh(xmin)`. `fh` is a function handle.