

Name: _____

ID#: _____

Enrolled Discussion (circle one): M-10am M-11am M-7pm F-10am F-11am F-12pm

MAE10

Midterm Examination I

Winter Quarter 2010

Instructions: You have 90 minutes to complete the exam. Notes on **one** side of an 8.5''x11'' sheet of paper are allowed. Closed book. No calculators or electronic devices of any kind.

Section 1: Short answer. (2 points each)

(1.1) What does MATLAB stand for?

(1.2) If your M-File is called **cheese3.m** what do you type at the command line to run your program?

(1.3) What does the command **clear** do?

(1.4) How many elements are in a 10x21 array?

(1.5) Which of the following is an example of binary code?

- (a) 20130402
- (b) 01011111
- (c) $a = [1:3:10]$
- (d) 18e4399x
- (e) 22222222

Section 2: Identify and briefly explain any and all *errors* that would prevent the code from executing in the following MATLAB programs. Warnings and “bad programming” are not considered errors – those would not prevent the code from running. If you believe there are no errors, write “OKAY”. (3 points each)

(2.1) `x = 5;
y = 10;
disp('The value of x is : ')
disp(y)`

(2.2) `x = 5;
y = 10;
disp(x , y)`

(2.3) `x = 'happy'
y = 'day'
disp(x(2))
disp(y(5))`

(2.4) `x = 'happy'
y = 'day'
disp([happy, y])`

(2.5) `a = [34 65 67 ; 54, 34, 98];
b = a(1:2,1:2);
c = a(1:1:1, 1:1:1);
a(1,1) = b(2,2);`

(2.6) `hi = [34 65 67 ; 54 34 98];
bye = [hi ; 99 88 77];
sigh = [bye' ; 101 102 103];
sigh = sigh';`

(2.7) `hi = 'bye';
bye = 'hi';
x = 7;
if(bye = 'hi' | x > 8)
 disp(bye)
end`

```
(2.8)  x = 22;
        y = 33;
        z = 11;
        if(x>y | z==z)
            y = z;
        else(x<y & x==z)
            z = x;
        else(z==y | x==y)
            x = y;
        end
```

```
(2.9)  city = 'Boston';
        Boston = 'Houston'
        switch Boston
        case {'city', 'Boston'}
            disp(city)
        case {city, Boston}
            disp('New Jersey?')
        else
            disp('Michigan')
        end
```

```
(2.10) w = 100;
        x = 5;
        y = 6;
        if(x > 5)
            if(w > y)
                disp(w)
            elseif(w==y)
                if(x==w)
                    disp(x)
                end
                x = y;
            elseif(y*2>x | x<w)
                disp(w)
            else
                disp(x)
            end
        end
```

Section 3: Write the *exact* output that will be produced by each of the following programs. Assume that there are no errors. Clearly distinguish answers from any scratch work and indicate which line of code each answer corresponds to. (4 points each)

(3.1) `cheese = 'food';`
`food = cheese;`
`disp(food)`
`disp(food(4))`
`disp([cheese , 'hi' , cheese])`

(3.2) `a = 2;`
`b = 3;`
`c = a^a*b-23;`
`d = (2 + 3*2)^2/4-1;`
`disp(c)`
`disp(d)`

(3.3) `x = [1 2 3 4];`
`y = [11 22 33 44];`
`y(4) = x(2);`
`x(2) = y(4);`
`x(3) = x(4)^2 - y(4);`
`y(1) = (x(2) - x(1)*y(4))^2;`
`disp(x)`
`disp(y)`

(3.4) `x = [1 0 2 3];`
`y = [2 2 3 3];`
`a = x.*y;`
`c = [x y];`
`d = [x ; y];`
`disp(a)`
`disp(c)`
`disp(d)`

```
(3.5) x = 3;
      y = 4.5;
      z = -12;
      if(x>y)
          disp(z)
          if(z<0)
              x = x - 1
              disp('bye')
          end
      else
          disp(z)
          if(z*z>0)
              y = x^2;
              disp('hello')
          end
      end
      disp(x)
      disp(y)
```

```
(3.6) x = 3;
      y = 2;
      name = 'Bill';
      if ( (x>2)&(6>=y) )
          y = x;
          if ( (x>2)|(y*2>3) )
              disp('howdy all')
          end
          name = [name 'y'];
      else
          name = [name 'y Goat'];
      end
      switch (name)
      case ('Bill')
          x = 100;
      case ('Billy')
          x = 101;
      case ('Billy Goat')
          x = 102;
      end
      disp([x y])
      disp(name)
```

```
(3.7) a = [1:1:3 ; 2:2:6];  
b = [a ; 1 2 3];  
c = [b' ; 1 1 1];  
g = mean( c(3,:) );  
h = mean( c(:,1) );  
j = mean( c(:) );  
disp(g)  
disp(h)  
disp(j)
```

Section 4: Write a MATLAB program to solve each of the following problems. You do not have to write the output of the code.

(4.1) Allow the user to input the current temperature. If the temperature is below 60, tell the user to wear warm clothing. If the temperature is 60 or greater and less than 80, tell the user to wear comfortable clothing. If the temperature is 80 or greater, tell the user to wear shorts and a t-shirt.
(4 points)

(4.2) Someone provides you with a 5×5 array called **A**. You do not need to know the values stored in **A** for this problem. (10 points)

(a) Store the values in the last column of **A** in a new 5×1 array called **B**

(b) Store the values in the 3rd and 4th columns of **A** in a new 5×2 array called **C**

(c) Create a new 5×3 array called **D**. The first column of **D** contains the values stored in **B**. The second and third columns of **D** contain the values stored in **C**.

(4.3) There are three functions:

$$y(t) = t^2 + 3$$

$$g(t) = 0.5t^3 - t + 1$$

$$h(t) = t - 1$$

Calculate the value of $y(t)$, $g(t)$, and $h(t)$ from $t = 0$ seconds to $t = 1000$ seconds in increments of 1 second. Display the values of t , $y(t)$, $g(t)$, and $h(t)$ in a four column table. It should look something like the following:

0	3	1	-1
---	---	---	----

1	4	0.5	0
---	---	-----	---

2	7	3	1
---	---	---	---

... (and so on) -- (5 points)

(4.4) There is a function $f(t)$ that satisfies the following criteria:

$$f(t) = t \quad t < 1$$

$$f(t) = t^2 \quad t \geq 1$$

Create a table where the first column lists t values from 0 to 2 in increments of 0.1. The second column will contain the corresponding $f(t)$ value. (5 points)