

Engineering 12 - Spring 2001
Test 1 Part 2

YourName: _____

1) (20 Points) Write the screen display for the following script and associated function in the space provided.

```
% script
m = 4
n = 5
[a,b] = confuse1(m,n)

...
function [a,b] = confuse1(m,n)
a = 2*m;
b = 3*n-m;
```

Display #	Display
1	m = 4
2	n = 5
3	a = 8
4	b = 11
5	
6	
7	
8	
9	
10	

Write the screen display for the following script and associated function in the space provided.

```
% script
m = 4
n = 5
[m,n] = confuse2(n,m)

...
function [n,m] = confuse2(m,n)
m = 3*m
n = 2*n-m
```

Display #	Display
1	m = 4
2	n = 5
3	m = 15
4	n = -7
5	m = -7
6	n = 15
7	
8	
9	
10	

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Problem 2. (18 Points) Identify the correct screen display, for the following MATLAB code.

```
a=5;
for k=1:10
    if(k==3 | k<2)
        kk=k+2;
        disp(kk)
    elseif (k<=6 & k>4)
        a=k*2;
        disp(a)
    elseif (k==10 | k==12)
        a=k;
        disp(a)
    elseif (k>9)
        a=a-1;
        disp(a)
    end
end
disp('done')
```

Display
3
5
10
12
10
done

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3) (20 points) Identify the correct screen display for the following MATLAB code:

```
v=[0 1 2 3 4];  
for k = 1:5  
    switch (k-1)  
        case {1,3}  
            v(k)=v(k)+v(k+1);  
        case {2,4}  
            v(k)=new+1;  
        otherwise  
            v(k)=k+1;  
    end  
    new=v(k)  
end
```

1) new = 2

2) new = 3

3) new = 4

4) new = 7

5) new = 8

6) _____

7) _____

8) _____

9) _____

10) _____

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4) (8 Points) The polyfit command attempts to fit a polynomial ($a_n x^n + a_{n-1} x^{n-1} + \dots + a_0 = y$) to a dataset.

The following is a list of the polyfit commands and results (each for a different dataset), write the equation in the form of $y = f(x)$ represented by the output of the polyfit command:

```
Coeff=polyfit(x,y,3)
Coeff =    -4     0     1     5
```

Equation: $y = -4x^3 + x + 5$

```
Coeff=polyfit(x,log(y),1)
Coeff =     2     0
```

Equation: $y = e^{2x}$

```
Coeff=polyfit(log(x),log(y),1)
Coeff =     2     0
```

Equation: $y = x^2$

```
Coeff=polyfit(x,y,1)
Coeff =     2     0
```

Equation: $y = 2x$

5) (6 Points) For the following MATLAB commands, what is the resulting value of y?

```
x =    -1     3
func_f =x.^2-4*x
y =     5    -3
```

6) (6 Points) You wish to write a script that will analyze the following function:

$$f(x) = \frac{x^2 \cos(2x+1)}{(6x) \ln x}$$

Write the m-file required to define this as a MATLAB function. Call the function fun_x and pass the function x and return the value y.

```
function y=fun_c(x)
y=((x.^2).*cos(2*x+1))./((6*x).*log(x))
```

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7) (22 points) You are a TA reviewing a Matlab script turned in by a student. The script begins on the next page, and the lines are numbered for convenience. To figure out the problems with this script, you must answer the following questions:

a) i) What is the purpose of the statements included in lines 1 through 4?

(2 points) To allow the program user to specify a different data file for analysis each time the program is run.

ii) What error is made in both lines 3 and 4?

(2 points) Should be $x=data(:,1)$ and $y=data(:,2)$. Filename is the input string variable.

b) i) What is the purpose of variable *keepgoing* in line 6?

(2 points) Presets the while loop variable to start it running.

ii) What will happen based on the value it is assigned? What should the value be?

(2 points) If “keepgoing” is assigned 0, then the while loop will not execute. The value should be set to 1.

c) List 4 errors which occur on lines 9, 14, 19 and 22.

(1 point) Variable “plot_desired” is a number, thus ‘s’ is not needed at end of input command.

(1 point) Polyfit command requires a third input argument of 1 to specify a linear fit

(1 point) Statement should be “slope = line(1), because the slope is the first element of the output polynomial coefficient array for a first order linear polynomial fit

(1 point) Should be “case” , not “elseif”

d) In lines 27 through 30, a function is called which performs a linear fit to a log-log plot of the data.

i) Based on the definition of the function specified on line 44, is the function called properly from line 28? If not, why?

(2 points) No. The call statement is missing on of its input arguments.

ii) Based on the definition of the function, how should the function file be saved?

(2 point) log_log.m

iii) Write the equation which linear fit to a log-log plot ultimately provide?

(2 points) $y = b * x^a$

iv) The same mistake is made on lines 47 and 49 of the function file. What is this mistake?

(2 points) In the polyval command, log(x) needs to be used as the input argument for the x values at which the log_log_fit vector is determined. Similarly, in line 49, the fit equation should be plotted with the log(x) values, not the x values.

e) What is the purpose of the set of statements included in lines 32 through 35?

(2 points) To allow the while loop to run again if an incorrect user response is entered.

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```
1. filename = input('Enter the full name of the data text file containing x values in column 1 and y values in column 2 (Ex:
                    dataset1.dat): ', 's')
2. data = load(filename);
3. x = filename(:,1);
4. y = filename(:,2);
5.
6. keepgoing = 0;
7. while keepgoing == 1
8.     disp('Select type of regression to perform on data file.')
9.     plot_desired=input("Type \"1\" for Linear, \"2\" for Semi-log linear, \"3\" for Log-log linear, 's');
10.
11.    switch plot_desired
12.
13.        case 1                                % Performs linear fit to data
14.            line = polyfit(x,y);
15.            yfit = polyval(line,x);
16.            plot(x, y, 'm*', x, yfit, 'k--')
17.            title('X vs. Y Plot with Linear Fit')
18.            disp('Linear Fit coeffiecents are:')
19.            slope=line(2)
20.            intercept=line(1)
21.
22.        elseif 2                                %Performs linear fit to semi-log plot of data
23.            [a,b] = semi_logf(x,y);
24.            disp('Exponential equation coefficients are:')
25.            a, b
26.
27.        case 3                                %Performs linear fit to log-log plot of data
28.            [a,b] = log_logf(x);                % See function below
29.            disp('Power Function coefficients are:')
30.            a, b
31.
32.        otherwise
33.            disp('ERROR: Incorrect input given')
34.            again=input("To try again type \"1\", otherwise type \"0\": ");
35.            keepgoing=again;
36.        end
37.    end
38.
39. %=====
40. % Function file
41. % Performs linear fit to log-log plot of data, plots the fit,
42. % and returns the coefficients, a and b
43.
44. function [a,b] = log_logf(x,y)
45.
46. line = polyfit(log(x),log(y),1);
47. log_log_fit = polyval(line,x);
48.
49. plot(log(x), log(y), 'm*', x, log_log_fit, 'k--')
50. title('Log-log Plot with Linear Fit')
51.
52. a=line(1);
53. b=exp(line(2));
```