

Course Text Permitted. Time: 10 minutes.

1. What is the basic user interface for MATLAB?

- a. MATLAB Desktop
- b. MATrix LABoratory Window
- c. MATLAB Command Window
- d. MATLAB Figure Window

10

2. How many GUI tools are accessible from the MATLAB Desktop?

10

3. Enter the command that will list the name and size of all the MATLAB variables in the Workspace.

whos

4. Assume the workspace contains variables named x, y and z. Enter the command which will delete only the variable x.

clear x

5. What is the name of the command that can start the Workspace Browser from the Command Window?

workspace

6. The contents of a variable can be displayed by double-clicking the mouse on the variable name in the Workspace Browser.

- a. True
- b. False

7. Previously executed MATLAB commands can be recalled using the:

- a. Page Up key
- b. Backspace key
- c. Up Arrow key
- d. Esc key

8. What is the name of the command that can start the Current Directory Browser from the Command Window?

file browser

9. You have an open MATLAB Command window. The present working directory for your MATLAB session is C:\MATLAB\work. The MATLAB workspace contains four variables named: var1, var2, var3 and var4. List the MATLAB commands (and only the MATLAB commands) that will save the variables var2 and var3 in the file results.mat in the directory C:\MATLAB.

Clear var1

Clear var4

~~save file browser~~ cdl  C:\MATLAB

Save results

✓

## ELECTRICAL ENGINEERING 290

## Quiz 2

Name: Craig Bloch-Hansen  
 Student Number: 147742

Time: 10 minutes

1. Arrange the following symbols in their order of precedence when used in a MATLAB statement,  $\wedge$ ,  $+$ ,  $*$ ,  $-$ ,  $( )$ ,  $/$ .

Highest  $( )$ 
 $\wedge$   
 $*, /$   
 $+, -$ 

Lowest

2. Enter the MATLAB statement(s) that will evaluate the absolute value of  $x$ .

ans = abs(x) ✓

3. What is the MATLAB statement(s) that will calculate  $x$ , where  $2e^{2x} = 12$ .

ans = log(6)/2 ✓

4. What is the MATLAB statement(s) that will produce the cube root of 8?

~~ans = 8^(1/3)~~ ans = 8^(1/3) ✓

5. In MATLAB is  $\sin(0) = 0$ ? Why or why not?

Yes, because  $\frac{0}{1} = 0$ . ✓

6. What is the MATLAB statement(s) that will evaluate  $\cos(\theta)$ , where  $\theta = 60$  degrees?

ans = cos(60 \* pi/180) ✓

7. What is the MATLAB statement(s) that will evaluate  $\ln(e^4) - \log_{10}(10^4)$ ?

ans = log(exp(4)) - log10(10^4) ✓

8. What is the MATLAB statement(s) that will evaluate  $\arccos(a/c) - \sin(b/c)$ , where  $a = 2\sqrt{3}$ ,  $b = 2$ ,  $c = 4$ ?

ans = acos(2\*sqrt(3)/4) - sin(2/4) ✓

9. List two different MATLAB statements that will calculate  $\sqrt{5}$ .

sqrt(5), 5^(1/2) ✓

10. What is the purpose of a semicolon (;) at the end of a MATLAB statement?

to suppress the display of a command, or to end a command to put multiple commands on the same line. ✓

## ELECTRICAL ENGINEERING 290

## Quiz 3

Name: Craig Bloch-Hansen  
 Student Number: 147792

Time: 15 minutes

9.5

1. Generate a MATLAB statement that will produce a column vector,  $\mathbf{x}$ , which consists of the following elements: 8, 1, 9, 5,  $\cos(\pi/3)$ .

$$x = [8; 1; 9; 5; \cos(\pi/3)]$$

2. Generate a MATLAB statement that will produce a row vector,  $\mathbf{x}$ , with the starting element being 4, the last element being -3.8, and the difference between each pair of adjacent elements being 0.3.

$$x = [4; -0.3; -3.8]$$

3. Generate a MATLAB statement that can generate a vector with 10 equally spaced elements, with the starting element being 2 and the last element being 7.

$$\text{linspace}(2, 7, 10)$$

4. The statement `size(x)` produces the MATLAB response `ans = 1 500`. What type of vector is  $\mathbf{x}$ ?

row vector

5. Generate a MATLAB statement that will produce a column vector,  $\mathbf{x}$ , whose elements are all the even numbers from 1 to 51.

$$x = [2:2:50]'$$

6. There are two row vectors,  $\mathbf{x}$  and  $\mathbf{y}$ , in the workspace. Generate a MATLAB statement that produces a vector,  $\mathbf{z}$ , which contains the first 50 elements of  $\mathbf{x}$  followed by the last element of  $\mathbf{y}$ .

$$z = [x(1:50) + y(\text{end})]$$

7. The vector,  $\mathbf{x}$ , has been placed in the workspace. What is the MATLAB statement that will delete the fifth and sixth elements of  $\mathbf{x}$  using the null vector.

$$x(5:6) = []$$

8. Two row vectors,  $\mathbf{a}$  and  $\mathbf{b}$ , having the same length have been placed in the workspace. What is the MATLAB statement that will perform an array multiplication of  $\mathbf{a}$  and  $\mathbf{b}$ .

$$c = a .* b$$

9. Generate a MATLAB statement that will calculate the dot product of the two row vectors  $\mathbf{x}$  and  $\mathbf{y}$ , which have been placed in the workspace.

$$z = x .* y'$$

10.  $P$  dollars is placed in a savings account at an annually compounded interest rate of  $i * 100\%$ . At the end of  $n$  years there is  $R$  dollars in the account, given by  $R = P(1+i)^n$ . Generate a single MATLAB statement that will determine  $R$  for  $n = 5, 10, 15, 20$  and  $25$  years,  $i = 10\%$  and  $P = 10$  dollars.

$$R = 10 .* (1 + 0.10).^ [5; 10; 15; 20; 25]$$

## ELECTRICAL ENGINEERING 290

## Quiz 4

Name: Craig Bloch-Hansen  
Student Number: 147742

Time: 10 minutes

8.5

1. A multiple line plot is to be generated using the two commands `plot(x,y)` and `plot(x,z)`. What additional command is required to ensure these two plots appear on the same figure window?

Hold on

2. Generate the MATLAB commands that will plot the equation  $y = x^2 + 1$  versus  $x$ , where  $x$  can take on the values -2 to 2 in steps of 0.2. Label the x-axis with `x Values`, the y-axis with `y Values` and make the title `Plot of a Parabola`.

$$x = -2 : 0.2 : 2;$$

$$y = x.^2 + 1;$$

$$xlabel('x Values'); ylabel('y Values'); title('Plot of a Parabola'); plot(x, y)$$

3. Generate the MATLAB commands that will plot a straight line,  $y = mx + b$ , versus  $x$ , where  $m = 2$ ,  $b = 5$  and  $x = 2.5$  to 5 in steps of 0.1.

$$x = 2.5 : 0.1 : 5;$$

$$y = 2 * x + 5;$$

$$plot(x, y)$$

4. Generate the MATLAB commands that will plot one cycle of two sine waves,  $y = a \sin(x)$ , for  $a = 1, 2$ , where the vector  $x$  has increments of 0.1. Display a legend on the plot that identifies these two plots as `sin(x)` and `2sin(x)`.

$$x = 0 : 0.1 : 2 * pi; legend('sin(x)', '2sin(x)')$$

$$y = \sin(x);$$

$$z = 2 * \sin(x);$$

$$plot(x, y, z)$$

5. What is the MATLAB command that will subtract one from all of the elements in array  $x$  that are greater than 2, where,  $x = [0 \ 1 \ 2 \ 3 \ 4]$ .

$$y = (x > 2) - 1$$

6. If  $vx = [1 \ 2 \ 3 \ 4]$ , what will the expression  $(vx \sim 3) + 2$  produce?

$$[3 \ 3 \ 2 \ 3]$$

7. The order of precedence for logical operators is:

(a) `|`, `&`, `~`, (b) `&`, `~`, `|` (c) `|`, `~`, `&` (d) `~`, `&`, `|`

8. For the vector  $x$ , give the MATLAB command that uses a logical function to return a logical TRUE if  $x$  contains any nonzero elements.

$$\text{any}(x)$$

9. Use the `all` command in a MATLAB expression to determine if  $vx$  and  $vy$  are the same size. Place a logical TRUE in  $r$  if they are the same size.

$$r = \text{all}(\text{size}(vx) = \text{size}(vy))$$

10. What MATLAB command will generate a logical variable  $r$ , which contains a logical TRUE if  $sx$  is greater than or equal  $sy$ .

$$r = sx \geq sy$$

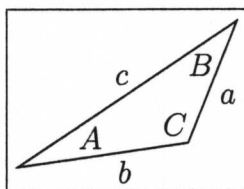
Name: Craig Bloch-Hansen  
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4

1. The cosine theorem for an arbitrary triangle is defined by the equations,  $c^2 = a^2 + b^2 - 2ab \cos(C)$ ,  $b^2 = a^2 + c^2 - 2ac \cos(B)$  and  $a^2 = b^2 + c^2 - 2bc \cos(A)$ , where  $a, b$ , and  $c$  are the lengths of the sides and the three angles  $A, B$ , and  $C$  subtends the sides  $a, b$ , and  $c$ , respectively, as shown in the figure below. Write an M-file function, called `costheoremfcn.m`, that has three input arguments and three output arguments. This function should calculate the angles, in degrees, from the three input arguments  $a, b$ , and  $c$ , and return the values of the angles as the three output arguments.

Provide suitable comments so any user can understand and execute the function.



% Costheoremfcn.

% This function calculates the angles in degrees for any triangle given the lengths of the 3 sides: a, b, c.

% User must supply angles as a=, b=, c=

% C is angle opposite to side c

% B is angle opposite to side b

% A is angle opposite to side a

$$C = \left( \arccos \left( \frac{c^2 - a^2 - b^2}{-2ab} \right) \right) * 180 / \pi$$

$$B = \left( \arccos \left( \frac{b^2 - a^2 - c^2}{-2ac} \right) \right) * 180 / \pi$$

$$A = \left( \arccos \left( \frac{a^2 - b^2 - c^2}{-2bc} \right) \right) * 180 / \pi$$

