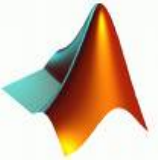




# EXAM 3 REVIEW

# Exam 3



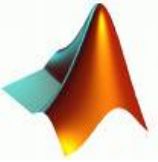
- Tuesday
  - 30 MC questions on paper in 30 minutes
  - Open book
  - Comprehensive
- Thursday
  - One programming problem in 60 minutes
  - Upload all files (no zipping) to the Blackboard
  - Comprehensive, but will focus on arrays, strings, files and user-defined functions

# List of Topics



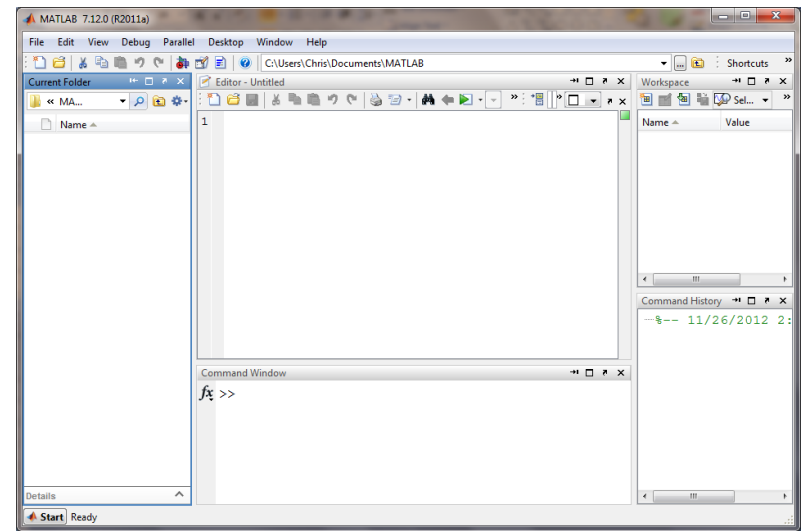
- Computers 101
- Developing a Solution
- Starting MATLAB
- Variables & Data-Types
- Inputs & Outputs
- Operators
- Library Functions (random, rounding, modulus...)
- Conditionals (if/switch)
- Loops (for/while)
- Arrays
- Strings
- User-Defined Functions
- High-level files
- Plotting

# Week 1



- Computers 101
  - Von Newman architecture
  - Hardware vs. software
  - Software categories
  - Generation of languages

- Problem solving steps
- The MATLAB environment



# Weeks 2 – 3



- Variable
  - definition
  - how to name them
- Data Types
  - which are
  - purpose
- Inputs/Outputs
  - input()
    - numerical vs. string
  - inputdlg()
  - fprintf()
  - placeholders & modifiers
  - disp() & display()

# Week 4



- Operators
  - arithmetic
  - relational
  - Boolean
  - unary vs. binary
- Library Functions
  - built-in (library) vs. user-defined
  - rand()
  - randi()
  - round()
  - ceil()
  - floor()
  - mod()
  - ...

# Week 5



- Conditionals (1)

```
if
elseif %0 to
unlimited times
else %0 or once
end
```

- Conditionals (2)

```
switch
case %unlimited
otherwise
end
```

- Compare the `switch` to the `if`?

# Week 6



- Loops

- loop control variable(s)
- Initialize
- Update
- Conditional to stop

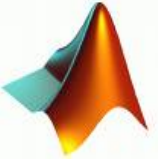
- Loops

```
for  
end
```

```
while  
end
```

- Compare the `for` and the `while`





# Weeks 7 – 9: Arrays!!

- Arrays
  - purpose
  - creating by hardcoding
  - creating with functions
    - rand()
    - zeros()
    - ones()
  - creating them by loops
- Operations on arrays
  - Concatenating them
  - referencing the content of cells
  - slicing
  - augmenting
  - diminution
- Math & Arrays
  - array math: .
  - matrix math
- Traversing arrays
  - Loops!
- Are loops necessary to analyze arrays?
  - sum()
  - prod()
  - mean()
  - Logical ops on arrays\*\*\*\*\*
  - find()
  - Tons of built-in functions

# Week 10: Plotting



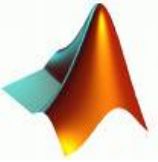
- `plot(x, y, formatstring)`
  - x and y: vectors of the same size
    - color
    - marker type
    - line type
  - but there are more modifiers than just above
- label, title, hold, grid and more...
- Other types of plots and charts
- 2D and 3D

# Week 11: Strings; Cell Arrays



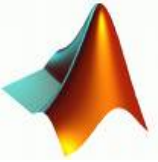
- Strings
  - definition
  - operations
  - library functions
    - strcmp() series
    - strfind()
    - sprintf()
    - string <-> number conversions
  - IS family
- Cell Arrays
  - mixed data types
  - ( ), [ ], or { }?
  - use of cell arrays

# Week 12: Files; Functions



- Functions
  - advantages
  - set-up
  - Vocabulary:
    - parameter list
    - function's name
    - return-values
    - function call
    - arguments
    - collecting
- High-level files
  - dlmread()
    - argument(s)?
    - return-value(s)?
  - xlsread()
    - argument(s)?
    - return-value(s)?

# Practice Questions



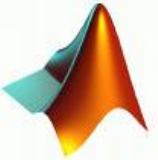
- A basic keyboard is **typically** considered to be an:



- a. Input device
- b. Output device
- c. Input/output device
- d. None of the above

[www.wikipedia.com](http://www.wikipedia.com)

# Practice Questions



- Input/Output

1. T/F `input()` returns multiple variables
2. T/F The following function call for the `input()` command is valid.

```
k = 1;
```

```
x = input('Please enter x%d: ', k);
```

4. Indicate the data-type for the following placeholders:

```
%f      %c      %d      %s
```

5. What is the first argument of the `fprintf()` function?
6. How many arguments can the `fprintf()` have?
7. T/F There is no return value to the `fprintf()` function?

# Practice Questions



What will appear in the command window after executing this code?

```
z=5;  
fprintf('The answer is z')
```

- a. The answer is 5
- b. The answer is z
- c. The answer is 5.00
- d. The code will cause an error.

# Practice Questions



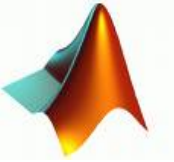
Which set of values correctly represents the possible outcomes of this `rand` statement?

```
rand_num= round((rand*4)+6)
```

- a. 6, 7, 8, 9
- b. 7, 8, 9, 10
- c. 7, 8, 9
- d. 6, 7, 8, 9, 10



# Practice Questions



- Conditionals (The `if` construct)

What are the errors or unnecessary code in the following if statement?

```
if 2<x<9
    fprintf('x is between 2 and 9\n');
else if x<=2 || x=>9
    if x<2
        fprintf('x is less than 2\n');
    else x>9
        fprintf('x is greater than 9\n');
end
```

# Practice Questions



- `if` statements

```
if x>2
    if y<10
        z = z+1;
    end
else
    z = round(z);
    if x<-10
        y = x+y;
    end
end
```

## Case 1

At beginning:

x = 2;  
y = 6;  
z = -3.3;

At end:

x = ?  
y = ?  
z = ?

## Case 2

At beginning:

x = 52;  
y = 6;  
z = -3.7;

At end:

x = ?  
y = ?  
z = ?

# Practice Questions



- Evaluate this program, after filling in the blanks:

```
switch mod(x,2)
    case 0
        fprintf('x is _____\n ');
    case 1
        fprintf('x is _____\n');
    otherwise
        fprintf('oops... ');
end
```

- 1) when x is 12
- 2) When x is 25
- 3) When x is 22.3

# Practice Questions



- Which loop(s) below will loop 5 times?

```
for x = 1:5  
end
```

```
for x =  
1:2:10  
end
```

```
for x =  
5:-1:1  
end
```

```
for x =  
10:-1:5  
end
```

```
x=1;  
while x <=5  
    x = x+1;  
end
```

```
x=1;  
while x <=6  
    x = x+1;  
end
```

# Practice Questions



Which of the following built-in functions will CREATE a plot.

- a. `polyval()`
- b. `polyfit()`
- c. `xlabel()`
- d. `polar()`
- e. None of these

# Practice Questions



If

```
a = [1;2;3];
```

```
b = [4;5;6];
```

```
c = [7;8;9];
```

```
A = [a,b,c];
```

```
B = [a,b];
```

Which of the following are **not** legal MATLAB commands? Select all.

a) a+b

b) a.\*b

c) a\*b

d) A\*A

e) A\*B

f) A.\*B

# Practice Questions



Which will define a cell array in MATLAB?

- a) `A = [1, 2, 3];`
- b) `A = ['abc', 'det'];`
- c) `A = {1, 2, 3};`
- d) `A = ('abc', 'edt');`
- e) **None of these**

# Practice Questions



Suppose the MATLAB variables,  $x$  and  $y$ , are defined in this manner:

```
x = [3, 5, 7, 8; 1, 13, 2, 12; 32, 31, 43, 62]
```

```
y = [98, 99, 78, 53]
```

Which of the following MATLAB commands will augment  $x$  with  $y$ ?

- a) `x = x + y;`
- b) `x = [x, y];`
- c) `x = [x; y];`
- d) `x = y % x;`
- e) **None of these**



# Practice Questions



In MATLAB, if

```
h = [9 6 4; 6 7 10; 4 7 8];
```

Which of the following statements will copy all elements of `h` to `b`?

- a) `b = h( : , ; );`
- b) `b = h( ; , ; );`
- c) `b = h( : , : );`
- d) `b = ( h : h ) ;`
- e) **None of these**

# Practice Questions



When provided a matrix as argument, the `length()` function will return:

- a) The number of rows in the matrix
- b) The number of columns in the matrix
- c) A vector of the magnitude of all dimensions
- d) The magnitude of the largest dimension
- e) **None of these**

# Practice Questions



After the following MATLAB commands execute, what is contained in Y?

```
die=[1 6 3 3 4 6 2 1 5];  
Y = find(die>5);
```

- a. [0 1 0 0 0 1 0 0 0]
- b. [0 1 0 0 0 1 0 0 1]
- c. [2 6]
- d. [2 6 9]
- e. None of these

# Practice Questions



Which sample MATLAB code demonstrates correct usage of a "vector operation"?

a. `x = [1, 3, 5, 7, 9];`  
`y = x * 6;`

b. `x = [1, 3, 5, 7, 9];`  
`y = x(3);`

c. `x = [1, 3, 5, 7, 9];`  
`x(4) = 3;`

d. None of these

# Practice Questions



Consider the following MATLAB code:

```
a = [1 0 0 0];  
b = [1 0 1 0];  
c = [1 1 0 0];  
x = (a & b) | c;
```

What is the value of x after the code executes?

- a. [1 1 0 0]
- b. [1 0 0 0]
- c. [1 1 1 0]
- d. [0 0 0 0]

# Practice Questions



Which statement(s) is/are valid to create a string?

`x = "EGR 115"`

Valid

Invalid

`x = 'EGR 115'`

Valid

Invalid

`x = sprintf('%s %d', str, num)`

Valid

Invalid

`x = str2num('115')`

Valid

Invalid

`x = num2str('115')`

Valid

Invalid

`x = double('EGR')`

Valid

Invalid



# Practice Questions

What value will be in the variable `len` after executing this MATLAB code:

```
str='Hello World';  
len=length(str);
```

- a. 10
- b. 11
- c. 12
- d. 13

# Practice Questions



`strcat()` is a built-in function that can be used to delete \_\_\_\_\_ spaces from a string.

- a. leading
- b. internal
- c. trailing
- d. all
- e. no





# Practice Questions

After running this MATLAB code, what value will be saved in the variable `str_edit`?

```
str='Hello World';  
str_edit=str(4:8);
```

- a. Hello Wo
- b. lo W
- c. lo Wo
- d. loWo



# Practice Questions

After running this MATLAB code, what value will be saved in the variable `str`

```
str='Hello World';  
str(6)=[];
```

- a. Hello World
- b. HelloWorld
- c. []
- d. The code will cause an error.

# Practice Questions

What is the value stored in the variable `chk`

```
chk = strcmp('yes', 'Yes');
```

- a. 0
- b. 1
- c. [0 1 1]
- d. [1 1 1]





# Practice Questions

- What is the value stored in the variable `chk`?

```
chk = ('Mark' == 'mark')
```

- a. 0
- b. 1
- c. [1 1 1 1]
- d. [0 1 1 1]



# Practice Questions

Consider the following MATLAB code. Which type of data is being collected?

```
R = xlsread('myFile.xls');
```

- a. numerical array
- b. array of strings
- c. cell array
- d. both options a & b are correct.
- e. options a, b, & c are all correct.
- f. None of these



# Practice Questions

- The part that is circled is called:

`function`  $W = M(A, B)$

- a. function
- b. Return variables
- c. Function name
- d. Parameters

# Practice Questions



The part that is circled is called:

```
function W = M ( A, B )
```

- a. function call
- b. return variables
- c. function name
- d. parameters
- e. arguments

# Practice Questions



The part that is circled is called:

W = MyFunc ( A, B )

- a. function call
- b. return values
- c. arguments
- d. parameters



# Practice Questions



Match the red portions to the description (options may be used more than once):

- |  |                         |
|--|-------------------------|
| a. [ <b>x</b> , <b>y</b> ] = func(a, b);         | 1. Arguments            |
| b. [x, y] = <b>func</b> (a, b);                  | 2. Name                 |
| c. [x, y] = func( <b>a</b> , <b>b</b> );         | 3. Parameters           |
| d. [x, y] = <b>func(a, b)</b> ;                  | 4. Collection variables |
| d. function [ <b>a</b> , <b>b</b> ] = func(x, y) | 5. Call                 |
| e. function [a, b] = <b>func</b> (x, y)          |                         |
| f. function [a, b] = func( <b>x</b> , <b>y</b> ) |                         |



# Practice Questions

Consider the following MATLAB code, and decide where is the error:

```
X=linspace(1,100);  
Y=X^2;  
grid on  
plot(X,Y,'r');
```

- a. The error is in the FIRST line.
- b. The error is in the SECOND line.
- c. The error is in the THIRD line.
- d. The error is in the FOURTH line.



# Practice Questions

Where is the error?

```
for k=1:3
    prompt=('Player #', num2str(k), ':');
    Play(k)=input(prompt);
end
```

- a. The error is in the FIRST line.
- b. The error is in the SECOND line.
- c. The error is in the THIRD line.
- d. The error is in the FOURTH line.