

IF YOU HAVE SPECIFIC EXAM QUESTION  
THAT YOU WANT TO GO OVER, PLEASE  
TYPE THEM INTO THE CHAT!

Announcements

- HW 4 has been released. It is a group HW (2 or 3) and is due 3/29.
- Next week we start the C material and you must use your gcc compiler in labs next week. The “chapters” for you to read are under “C Reference Materials”.
- Exam 2 today 4:30-6:15 for everyone (15 minutes longer than Exam 1). 1 hour and 30 minutes for the exam, 15 to upload)
  - To ask questions, you can email (list will be given on the exam instructions)
  - You may use MATLAB, but it is strongly recommended that you do not, as it is likely that doing so will cost you time.
  - Be careful on the exam
    - Programs must follow good programming style (e.g. use loops, use the for loop as the counted loop, etc.) but you don't have to write comments unless specified by the problem
    - DON'T MAKE THINGS HARDER THAN THEY ARE!!
    - If on the exam the method to be used isn't specified, use the easiest possible! Vectorize your code!
  - Write GENERAL code
  - Topics emphasized (from syllabus):
    - while loops, error-checking
    - different types of functions, Program organization
    - Scope, persistent variables
    - Function stubs
    - Strings and character vectors
    - Cell arrays
    - Structs, Vectors of structs, Nested structs
    - file input (fgetl only), file output
    - MAT-files
    - variable number of input/output arguments
    - statistics
    - sets
    - curve fitting

Review Quiz #5

GOOD LUCK ON THE EXAM!  
YOU'RE GOING TO CRUSH IT!

## Exam Review!

```
set1 = 2:5;  
set2 = [4, 0, -3, 2];  
intersect(set1, abs(-set2))  
ans =  
2 3 4 % no 'stable' passed so automatically sorts
```

```
ismember(set1, set2)  
ans =  
1 0 1 0 ← logical array  
* evaluates set1 in set2
```

```
vec1 = 3:6;  
median(vec1)  
ans =  
4.5
```

```
mode([vec1], 2:4)  
ans =  
3  
T bimodal, MATLAB returns smallest value
```

set1: 2 3 4 5  
set2: 4 0 -3 2

vec1: 3 4 ↑ 5 6

3 4 5 6  
2 3 4

## Anonymous Func.

format:

```
functionhandle = @(x) x.^2 + 5.*x + 5;  
examplecall = functionhandle(1)  
examplecall = 11
```

What about multiple inputs?

```
anony = @(x, a) 4.*x - a;
```

anony(5, 2)

anony(1:4, 3)

18

1 5 9 13

## FUNCTION STUB

```
function out = make_a_matrix(a, b, c)  
% multiplies a matrix by third argument elementwise (a & b are size)  
out = ones(a, b).*c  
end
```

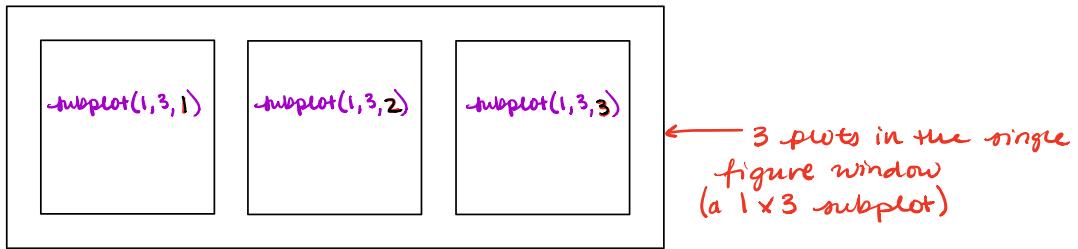
```
function my_sentence('Leah')  
disp('Hi!')  
end
```

### Subplot Example!

Write a function that only plots 3 sine graphs in a  $1 \times 3$  subplot. Each plot will have a random number of pts to plot (somewhere between 5 and 50). All plots will have x-values in the range from 0 to  $2\pi$ . The points should all be black circles. Finally, the titles of the three plots will indicate the number of points being plotted.

```
function plotranin % notice it's a plotting function so no output argument!
for i = 1:3
    npts = randi ([5, 50]);
    x = linspace(0, 2 * pi, npts);
    y = sin(x);
    subplot(1, 3, i) % m-dimension of an mxn subplot
    plot(x, y, 'ko') % which plot to fill in
    title(['uprint(''%d points'', npts)]) % goes row-wise, NOT
end % n-dimension of an mxn subplot
end
```

1 Figure Window



subplots are numbered  
row-wise!!!

## Polyval() and Polyfit()

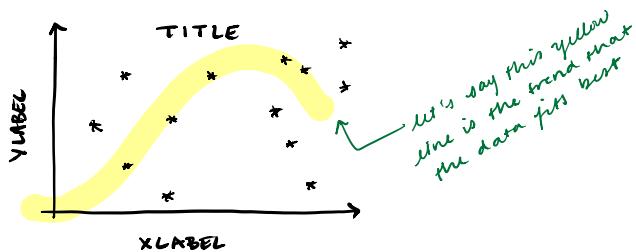
Ex.  $p1 = [3 \ 0 \ -1];$   
 $\text{polyval}(p1, 1:2) \rightarrow 3x^2 + 0x - 1$

$\text{polyval} =$  
$$\frac{3(2)^2 + 0(2) - 1}{2 \quad 11}$$

### Ex. (More practical)

- (a) Have a data file where first column is  $x$ -values, second column is  $y$ -values.  
 This data file is called raw-data.dat

```
load raw-data.dat
plot(raw-data(:,1), raw-data(:,2), 'k*')
xl=sprintf('%sLABEL', 'x');
yl=sprintf('%sLABEL', 'y');
title('TITLE')
xlabel(xl)
ylabel(yl)
```



- (b) Now using this plot, we want to fit the data! Let's say we want to fit a cubic meaning polynomial order is 3.

$\downarrow$  x-values       $\downarrow$  y-values       $\downarrow$  polynomial order  
 $p2 = \text{polyfit}(\text{raw\_data}(:,1), \text{raw\_data}(:,2), 3);$   
 $p2 =$   

$$-3 \quad 2 \quad -1 \quad 4 \qquad \qquad \qquad -3x^3 + 2x^2 - x + 4$$
  
 $\text{trend} = \text{polyval}(p2, \underline{\text{linspace}(0, 100, 1000)});$

(and if wanted to superimpose the trend line like in the above plot)  
 $\text{hold on}$   
 $\text{plot}(\text{linspace}(0, 100, 1000), \text{trend}, 'y')$   $y$  means yellow, not y-values  
 $\text{hold off}$