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# Homework #0

## Table of Contents

Introduction .....	1
Problem #1 : Area of a circle .....	1
Problem #2 : Vectorizing calculations .....	2
Problem #3 : Plot the graph of a function .....	2
Problem #4 : Continued fractions .....	3
Problem #5 : How to succeed in Math 365 .....	4

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Math 365, Spring 2015

## Introduction

The purpose of this homework is to become familiar with the Matlab publish command and to see how to turn in homework problems.

```
function hmwk0()
```

```
    prob1()  
    prob2()
```

This is an advanced technique for making sure your code executes to the end, even if one of your problems should fail.

```
    try  
        prob3()  
        fprintf('Problem 3 : Success!\n');  
    catch me  
        fprintf('Problem 3 : Something went wrong.\n');  
        fprintf('%s\n', me.message);  
    end  
    fprintf('\n');
```

```
    prob4()  
    prob5()
```

```
end
```

## Problem #1 : Area of a circle

In this problem, we compute the area of a circle of radius 4.5 and write it to a file 'area.dat'

```
function prob1()  
  
R = 4.5;  
area = pi*R^2;
```

```
% This file can be downloaded from the course website.
write_file(area, 'area.dat');

end
```

## Problem #2 : Vectorizing calculations

```
function prob2()
```

Matlab makes it very easy to manipulate vectors and arrays. Many commands that would normally require a "for" loop can be "vectorized", creating code that is generally faster and more compact than non-vectorized equivalents.

```
% Create an array of 11 equally spaced points in [-1,1]. Note that
% there are many ways to create an array in Matlab. This is the
% simplest way!
x = [1, 2, 3, 4, 5];      % x_i = i,   i = 1,2,3,4,5.
y = [7,6,5,4,3];        % y_j = 5-j, j = -2,-1,0,1,2.

% We can use a "loop" to create a vector z = x + y
z = zeros(size(x));
for i = 1:5,
    z(i) = x(i) + y(i);
end

% Vectorize this loop!
z = x + y;

% Store your z array to a file.
write_file(z, 'z.dat');

end
```

## Problem #3 : Plot the graph of a function

```
function prob3()
```

Create function handles for two functions and construct a third composite function.

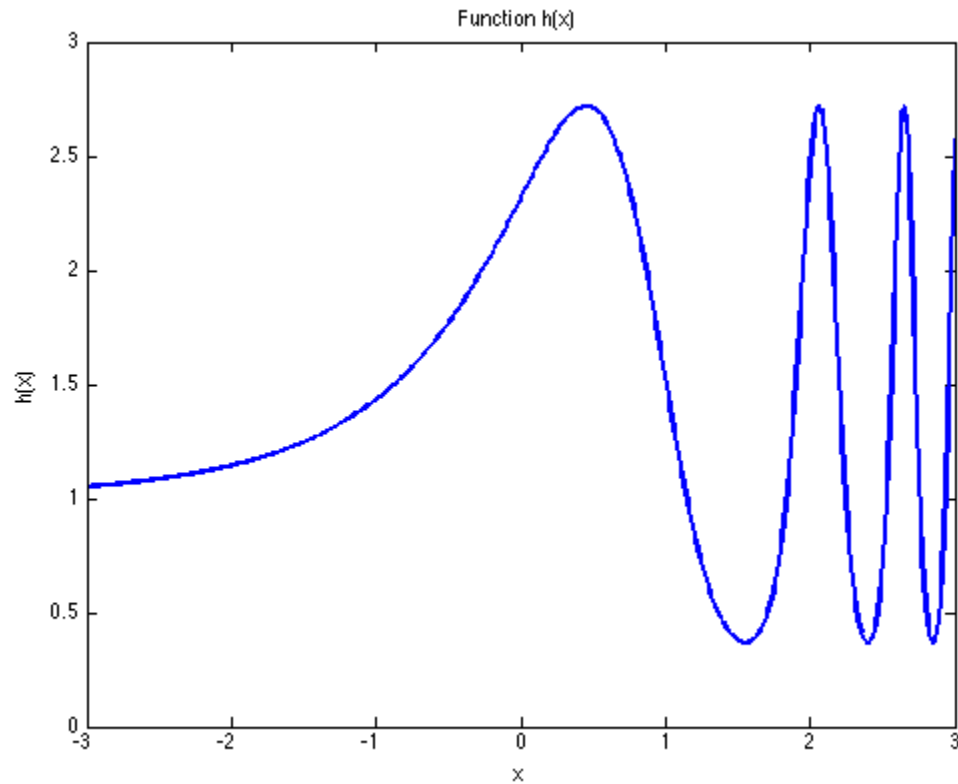
```
% Anonymous function handles
f = @(x) sin(x);
g = @(x) exp(x);
h = @(x) g(f(g(x)));

% Construct a vector of equally spaced points
x = linspace(-3,3,500);

% Plot the results
plot(x,h(x), 'linewidth', 2);
title('Function h(x)');
xlabel('x');
ylabel('h(x)');
```

end

Problem 3 : Success!



## Problem #4 : Continued fractions

```
function prob4()
```

Use a continued fraction to approximate  $\pi$ . Make sure that your code doesn't run off of the edge of the page.

Publish allows you to insert mathematical expressions (although they don't show up so well in PDF).

$$\pi \approx d_1 + \frac{1}{d_2 + \frac{1}{d_3 + \frac{1}{d_4 + \dots}}}$$

```
d = [3, 7, 15, 1, 292, 1, 1, 1, 2, 1, 3, 1, ...
     14, 2, 1, 1, 2, 2, 2, 2, 1, 84];
```

```
x = d(1) + 1/(d(2) + 1/(d(3) + 1/(d(4) + 1/...
    (d(5) + 1/(d(6) + 1/(d(7) + 1/(d(8) + 1/...
    (d(9) + 1/(d(10) + 1/(d(11) + 1/(d(12) + 1/...
    (d(13) + 1/(d(14) + 1/(d(15)))))))))))));
```

```
pi_approx = x;
```

```
fprintf('%15s %24.16f\n', 'pi (approx)', pi_approx);
```

```
fprintf('%15s %24.16f\n','pi (exact)',pi);  
fprintf('%15s %24.4e\n','Error',abs(pi-pi_approx));  
  
end
```

```
pi (approx)      3.1415926535897931  
pi (exact)      3.1415926535897931  
Error           0.0000e+00
```

## Problem #5 : How to succeed in Math 365

```
function prob5()
```

Publish allows you to create lists, use different font styles, and include preformatted code

### How to succeed in Math 365

- *Always* start your homework early
- *Don't* spend too much time googling for answers
- *Read* the [homework tips!](#)

### Steps for getting help on homework problems.

1. Read the Matlab tutorials available on the course website
2. Read lecture notes and demo codes on the online website.
3. Use Matlab online "help" system for help on Matlab commands.
4. Read the [Course textbook](#)
5. Email the professor for help, if you can't find answers in the above.
6. Do not spend too much time with Prof. Google or Dr. YouTube. This is likely going to be a waste of time! Spend more time thinking about what you have learned in class, and debugging your own code.

Include sample code that you don't want run by "formatting" the code like this.

```
curly = 4*pi;  
larry = sin(curly);  
moe = tan(curly + larry);
```

There are lots of helpful hints for publishing by issuing the command

```
>> doc publishing markup
```

```
end
```

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