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# Homework #0

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First Last  
Math 365, Spring 2017

## 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()  
  
    hmwk_problem(@prob1, 'prob1');  
    file_check('torus.out');  
  
    hmwk_problem(@prob2, 'prob2');  
    hmwk_problem(@prob3, 'prob3');  
    hmwk_problem(@prob4, 'prob4');  
    file_check('z.out');  
  
    hmwk_problem(@prob5, 'prob5');  
    file_check('h.out');  
  
    hmwk_problem(@prob6, 'prob6');  
    hmwk_problem(@prob7, 'prob7');  
    hmwk_problem(@prob8, 'prob8');  
    hmwk_problem(@prob9, 'prob9');  
  
end  
  
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%% Homework utility routines %%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%  
%%  
function hmwk_problem(prob,msg)  
try  
    prob()  
    fprintf('%s : Ran to completion.\n',msg);  
catch me  
    fprintf('%s : Something went wrong.\n',msg);
```

```
        fprintf('%s\n',me.message);
end
fprintf('\n');
end
function write_file(data,filename)
save(filename,'data','-ascii','-double');
end
function file_check(fname)
if ~exist(fname,'file')
    fprintf('WARNING! You have not written out file '%s'\n',fname);
    fprintf('Use function 'write_file' to write out your data to a
    file\n');
end
end
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
```

## Problem #1 : Surface area of a torus

In this problem, we compute the surface area of a torus whose inner radius is 3.21 and whose outer radius is 3.56. The result is saved to the file 'torus.out'

```
function prob1()

% Your work goes here

end

prob1 : Ran to completion.

WARNING! You have not written out file 'torus.out'
Use function 'write_file' to write out your data to a file
```

## Problem #2 : Richter Scale

```
function prob2()

% Your work goes here

end

prob2 : Ran to completion.
```

## Problem #3 : Smartphones

```
function prob3()

% Your work goes here

end

prob3 : Ran to completion.
```

## Problem #4 : Vectorizing calculations

```
function prob4()
```

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 arrays x and y

% Use a "loop" to create a vector z = x + y
% ....

% Vectorize this loop!
% ....

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

end

prob4 : Something went wrong.
Undefined function or variable 'z'.
```

## Problem #5 : Plot the graph of a function

```
function prob5()
```

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

```
% Create Anonymous function handles
f = @(x) sin(x);
% ...

% Construct a vector of equally spaced points using 'linspace'
% x = ...

% Plot the results; add a title and axes labels.

write_file(h(4.3), 'h.out');

end

prob5 : Something went wrong.
Undefined function 'h' for input arguments of type 'double'.
```

## Problem #6 : Continued fraction approx. to pi

```
function prob6()
```

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).

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

```
% Your approximation goes here!
% pi_approx = ...

pi_approx = 3; % not correct!

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)          3.0000000000000000
      pi (exact)          3.1415926535897931
      Error                1.4159e-01
prob6 : Ran to completion.
```

## Problem #7 - Continued fraction approx. to e

```
function prob7()

% Your work goes here

end

prob7 : Ran to completion.
```

## Problem #8 : Loading data from a file

```
function prob8()

Load data from a file and report the mean and standard deviation.

h = load('heights.dat');

fprintf('%12s %12d\n', 'Count', length(h));
fprintf('%12s %12.2f\n', 'Min', min(h));

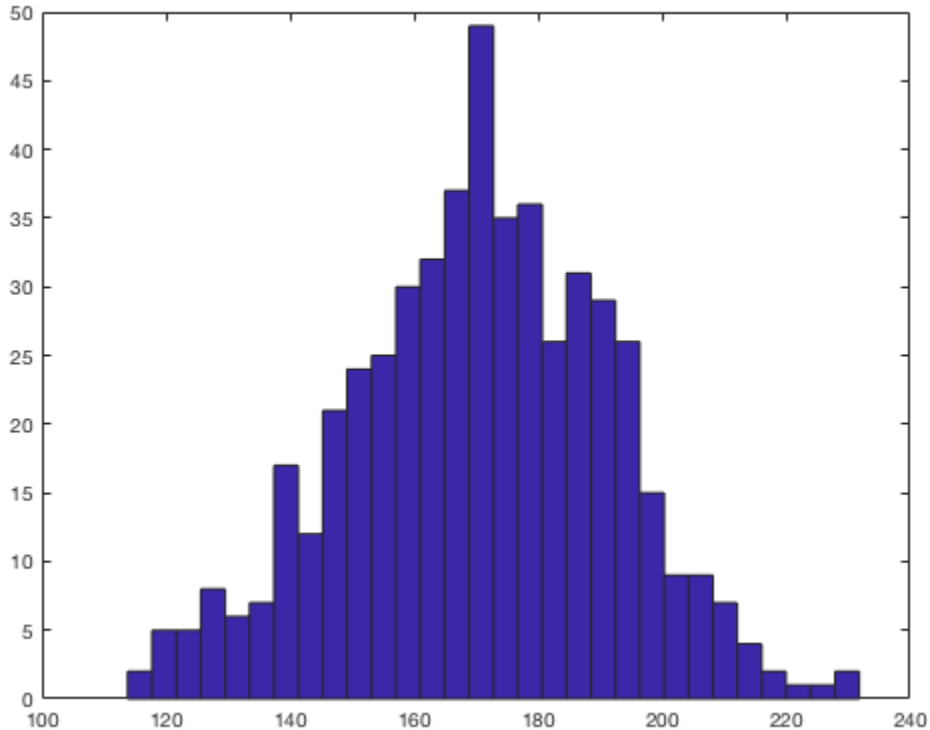
% Add remaining computations here

% Create a histogram of the data.
hist(h, 30);

end

      Count                513
```

Min 113.81  
prob8 : Ran to completion.



## Problem #9 : How to succeed in Math 365

`function` prob9()

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. Use exactly three spaces between the percent sign and your code.

```
    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
```

```
prob9 : Ran to completion.
```

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