

### In-Class Exercise 3: Feval and global

1. Rewrite the following function m-file using “vectorization”. You should be able to reduce all of the lines after the **function y = ...** line to one line which does not use **if** or **for**.

```
function y = ex03prob1(x)

y = zeros(size(x));
m = length(x);

for i = 1:m
    if x(i) < 0.5
        y(i) = sin(pi*x(i));
    else
        y(i) = 1 - (x(i)-0.5);
    end
end
```

2. The following function m-file should accept a string called **funname** as an input with an optional vector of x-values. Complete the m-file using the **feval** command so that it will output the maximum y-value of the function **funname** at the appropriate x-values.

```
function [ymax,xmax] = ex3fun2a(funname, x)
% ex4fun2a.m -- The maximum value of a function
%
% inputs:
% funname -- a string containing the function name
% x -- a vector of x-values
%
% outputs:
% ymax -- maximum y-value that occurs
% xmax -- the place where xmax occurs

if nargin < 2
    x = [0:0.1:1];
end

y = ... % need to complete this line using feval

ymax = max(y);
xmax = find(y == ymax);
```

Use the function m-file **ex3fun2a** to find the maximum value of the function **ex3fun2b** (defined below) on the interval [-1,1] using 50 equally spaced points.

```
function y = ex3fun2b(x)
y = x.^3 - exp(x) - x;
```

What are ymax and xmax?

3. The following function m-file does not use any inputs. Instead it uses the global command.

```
function y = ex3fun3
% ex3fun3.m -- a function not needing inputs
%
global x % if x is not defined as a global variable
% in the main workspace then this command
% lets x=[]. Otherwise, x from the main
% workspace is used.
```

```
if isempty(x)
    x = [1:6]; % a default value for x
end
```

```
y = x.^2 - x;
```

```
plot(x,y)
title('A plot of y = x^2 - x')
```

What is the output of the following commands?

```
>> clear all
>> x = [0:2:8]
>> y1 = ex3fun3
>> x
>> global x
>> x
>> x = [-1:2:5]
>> y2 = ex3fun3
```

Why are y1 and y2 different? Is there a problem with x? Explain the effect of the global command.