

# Dr. Leon VanDommelen, Exam 1, 10/04/18, Question 1

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### IMPORTANT:

- 1) Do not change **anything** in this header! Put the solution to the question completely at the end of the file.
- 2) Since the solution requires a custom function Kepler, put a

```
%% Additional m-File: Kepler.m  
%  
% <include>Kepler.m</include>
```

block behind your main solution. (Copy the above three lines and paste them completely at the end of this file, behind a blank line. For each line, get rid of the first percent and the two spaces behind it.)

## Initialize

```
format compact  
more off
```

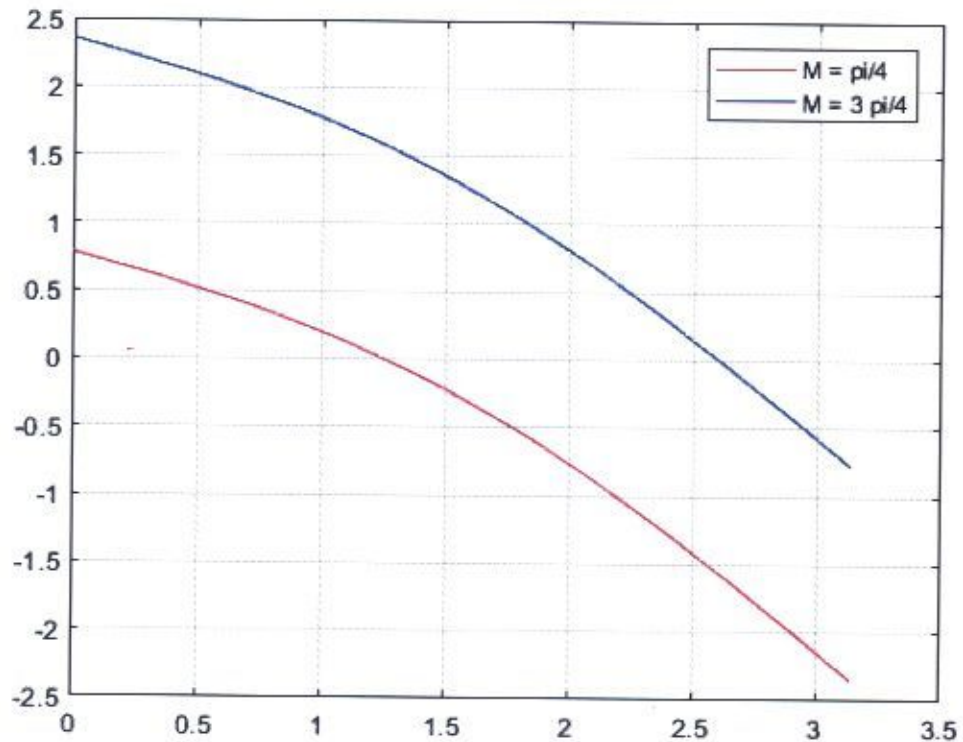
## My Solution:

```
% data for the two cases  
e=0.5;  
M1=pi/4;  
M2=3*pi/4;  
  
% plot curves  
EPlot=linspace(0,pi,100);  
error1Plot=Kepler(EPlot,M1,e);  
error2Plot=Kepler(EPlot,M2,e);  
plot(EPlot,error1Plot,'r',...  
      EPlot,error2Plot,'b')  
grid on  
legend('M = pi/4','M = 3 pi/4')  
  
% find values of E  
M=M1;  
E1=1;  
E2=1.5;  
E=fzero(@(E) Kepler(E,M,e), [E1 E2]);
```

- ① know must form error
- ① write Kepler.m
- ② plot curves
- ② grid
- ② legend
- ⑤ find intervals
- ⑤ fzero call
- ⑤ anonymous function

```
fprintf('For e = %.3f and M = %.5f, E = %.5f (interval [%.3f %.3f]).\n', ...  
      e, M, E, E1, E2)  
M=M2;  
E1=2.5;  
E2=3;  
E=fzero(@(E) Kepler(E,M,e), [E1 E2]);  
fprintf('For e = %.3f and M = %.5f, E = %.5f (interval [%.3f %.3f]).\n', ...  
      e, M, E, E1, E2)
```

For e = 0.500 and M = 0.78540, E = 1.26170 (interval [1.000 1.500]).  
For e = 0.500 and M = 2.35619, E = 2.60975 (interval [2.500 3.000]).



## Additional m-File: Kepler.m

```
function error = Kepler(E,M,e)  
  
% evaluate the error in the equation  
error=M-E+e*sin(E);  
  
end
```