Table of Contents

```
%      _       _         _       _         _       _         _       _         _       _
%    (c).-.(c)     (c).-.(c)     (c).-.(c)     (c).-.(c)     (c).-.(c)
%     / ._. \       / ._. \       / ._. \       / ._. \       / ._. \
%   __\( Y )/__   __\( Y )/__   __\( Y )/__   __\( Y )/__   __\( Y )/__
%  (_.-/'-'\-._)(_.-/'-'\-._)(_.-/'-'\-._)(_.-/'-'\-._)(_.-/'-'\-._)
%     || O ||       || O ||       || O ||       || O ||       || O ||
%   _.' `-' '._   _.' `-' '._   _.' `-' '._   _.' `-' '._   _.' `-' '._
%  (.-./`-'\.-.)(.-./`-'\.-.)(.-./`-'\.-.)(.-./`-'\.-.)(.-./`-'\.-.)
%   `-'     `-'   `-'     `-'   `-'     `-'   `-'     `-'   `-'     `-'


%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
%    Author:   Matt Fletcher                                      %
%     Class:   ENG101, Fall, 2017                                 %
%   Helpers:   None                                               %
%                                                                 %
%   Program:   ENG101 Homework 3, Problem 1                       %
% Due Date:    18 Sep 2017                                        %
%                                                                 %
% Language:    MatLab                                             %
%       IDE:   MatLab R2017a                                      %
%                                                                 %
% Purpose:    Simulate die rolls                                  %
%                                                                 %
%                                                                 %
%                                                                 %
%    "Undocumented features": None.                               %
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%


%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
% Important Note for grader    %
%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%

%I wrote all 3 problems with a switch statement to help
% prevent problems caused by multiple program's variables
%To use each program, simply follow the instructions prompted at the
%beginning.
```

```
clear;
clc;
```

Problem Selector

```
fprintf('Which problem would you like to try? \n')
fprintf('\t 1. Die Roll \n ')
fprintf('\t 2. Electrical current \n ')
fprintf('\t 3. Flying ball \n ')
choice=input('Enter your choice number here>>> ');
    %Switch statement
    switch(choice);
```

Problem 1

```
    %If 1 is selected, do problem 1
    case(1)

        %%%%%%%%%%%%%%%%%
        %    Problem 1    %
        %%%%%%%%%%%%%%%%%
```

Housekeeping

```
        clear;
```

Computations

```
        %Cue user to input the number of trials they would like to try

        n_trials=input('How many trials? Larger number of trials
    suggested >>  ');



        %Generate random die rolls"
        die_roll=randi(6,[1,n_trials]);

        %Calculate the probability of rolling a 6
        prob_6=sum(die_roll==6)/n_trials;
```

Output

```
        %Display the number of rolls:
        fprintf('Number of rolls: %d rolls. \n', n_trials)


        %Display the probability of getting a 6
        fprintf('Probability of a rolling a 6: %.5f percent. \n',
    prob_6*100)
```

```matlab
        %Finds the positive difference between 1/6 and the calculated
probability.
        perc_error=(100*abs(1/6-prob_6)/(1/6));

        %Calculate percent error from 1/6th chance
        fprintf('Percentage error from 1/6th chance is %.5f percent.
\n',perc_error)
```

Problem 2

```matlab
    %If 2 is selected, do problem 2

    case(2)

        %%%%%%%%%%%%%
        % Problem 2  %
        %%%%%%%%%%%%%%
```

Housekeeping

```matlab
        clear;
```

Setup

```matlab
        %Set time interval
        t_=0:0.001:10;
        % As a note, the variable was named t_ in order to prevent
collisions
        % with the third problem

        %Define function
        v_s=3*exp(-t_./3).*sin(pi./t_);

        %If a value in the vector is less than zero, set it equal to
zero
        v_s(v_s<0)=0;

        %Plot graph
        plot(t_, v_s)

        %Add pretty stuff to graph
        xlabel('Time')
        ylabel('Voltage')
        grid on
        title('Voltage Across resistor WRT Time')
```

Problem 3

```matlab
    case(3)
```

```matlab
%%%%%%%%%%%%%%
%  Problem 3 %
%%%%%%%%%%%%%%
clear;

%Set given variables

%Initial speed
v_0=20; %meters per second

%Initial angle
theta=40; %degrees

%Acceleration due to gravity
g=9.8; %meters per second squared

%Time step
dt=0.001;
%Create time vector
t=0:dt:3;


%Create height vector
h=v_0.*t*sind(theta)-(g.*t.^2)./2;

%Create speed vector
v=sqrt(v_0^2-2*v_0*g.*t*sind(theta)+g^2.*t.^2);

%Plot left axis of height and time
yyaxis left
plot(t,h)
xlabel('Time (s)')
ylabel('Height (m)')

%Plot right axis of speed and time
yyaxis right
plot(t,v)
ylabel('Speed (m/s)')


%Find all times when height is no less than 6 meters AND speed
is less
%than 16 meters per second

%Set all times that meet this condition to vector k
k=find(h>=6 & v<=16);

%Calculate time frame
k=k.*dt;

%Print Time frame
true_start=k(1);
true_end=k(end);
```

```matlab
        %Print out requested information.
        fprintf('The ball satisfies the given conditions from %.2f
 seconds to %.2f seconds. \n', true_start, true_end)



        otherwise

            disp('BAD TA! yOu dIDnt FolLoW tHe rULeS')
        %End switch statement
    end
```

Which problem would you like to try?
* 1. Die Roll*
*   2. Electrical current*
*   3. Flying ball*

Error using input
Cannot call INPUT from EVALC.

Error in FletcherHW3 (line 47)
choice=input('Enter your choice number here>>> ');

Published with MATLAB® R2017a