problem 4

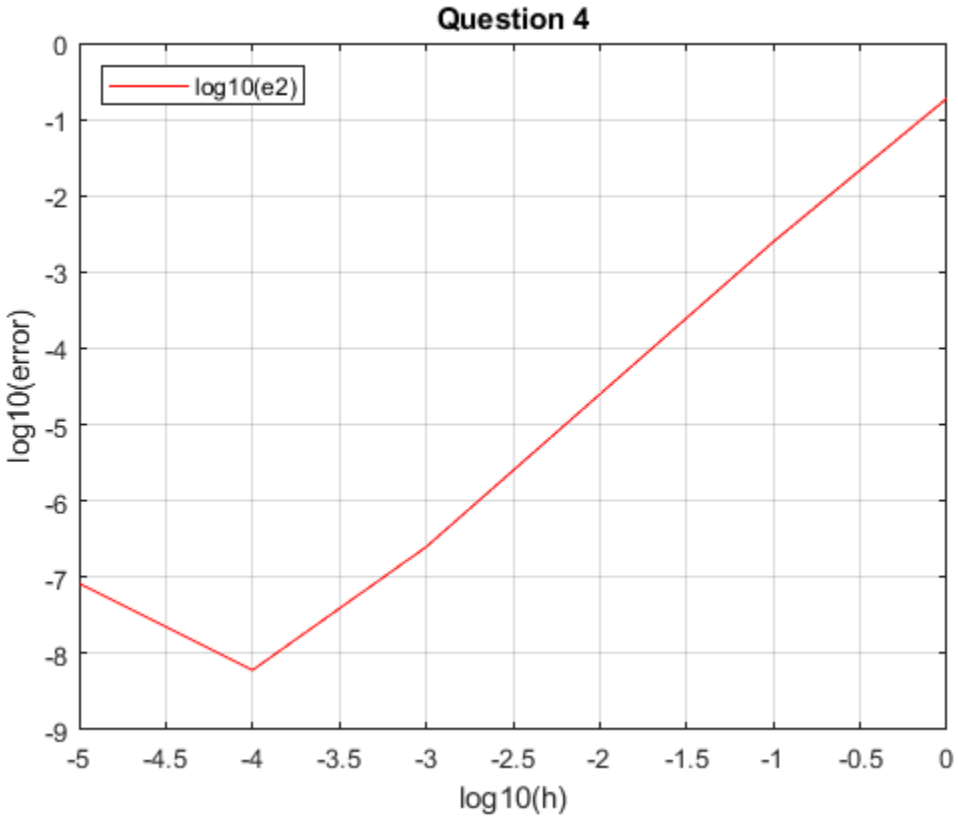
Objective: Caclulate the approximate 2nd derivative and its error for using the derAprox2nd function and steps of h= 10^-j with j values from 0-5. Then graph the log10 of the error against the log of h to compare. The error of a derrivative approximation is the absolute value of the derAprox(x) - f'(f)

Functions called derAprox2nd

Setting the value of the function f1 that will be approximated and setting its derrivative.

```
f1 = @(x) log((x^2) + 2);
d2f1 = @(x) (2/((x^2)+2)) - ((4*(x^2))/((x^2)+ 2)^2);
%
% Setting the array of values that h will be to the power to
%
j = 0:1:5;
%
% setting empty arrays for the values of e, e stands for error
%
e2 = zeros(1,6);
%
% Setting the empty h array
%
h = zeros(1,6);
%
% setting the value of xo that is used for the derrivative approximation
%
xo = 0;
%
% Starting the for loop to populate the e, eHat, eTilde, and h arrays. it
% iterates from 1 to 11 to use each value of j
%
for i = 1:1:length(j)
    %
    % Calling each derAprox function to compute the approximate
    % 2nd derrivative and populate the error arrays, using step as a temporary
    % variable
    %
    step = 10^(-j(i));
    e2(i) = abs(derAprox2nd(f1,xo,step) - d2f1(xo));
    h(i) = step;
end
%
% Creating a plot with log10(e2) against log10(h).
%
plot(log10(h),log10(e2), 'r')
%
% Adding a legend to the plot
%
legend('log10(e2)','Location', 'northwest');
%
% Adding Axis labels and title and adding grid
%
```

```
xlabel('log10(h)')
ylabel('log10(error)')
title('Question 4')
grid on
hold off;
```



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