Quiz (II)
Finished by 18:00 on 5/10
Please notice the figure numbers

1. [Figure 1] Plot the function g(x) = cosh($2x$) = ($e^{2x} + e^{-2x}$)/2 within the interval [-5, 5]. Save the x location of each plotted point for later use.

2. [Figure 2] Calculate the derivative, $\frac{d}{dx}g(x) = \frac{d}{dx}$ cosh($2x$), on each x location from Problem 1 with forward difference using 4 different h values 0.1, 0.01, 0.001, 0.0001. Plot the results of the derivatives calculated from the 4 different h values on the same figure as well as the exact solution. Remember to include figure legends to indicate the meaning of each curve.

3. [Figure 3] Plot the absolute error of all the results from 2 in logarithmic scale at each x (semilogy). How does the error change with h?

4. [Figure 4] Repeat 2 by using central difference.

5. [Figure 5] Repeat 3 and explain how the error changes with h as well.

6. [Figure 6] Given the function f(x) = $\frac{e^x - e^{-x}}{e^x + e^{-x}}$ = tanh x. Try to find f'(2) using forward difference and different h values ranging from 2^{-1} to 2^{-50}. Plot the absolute error versus h and estimate which h could give an optimal answer. What is the answer and how many significant digits does it have?

7. [Figure 7] Repeat 6 by using central difference.

Note: The functions "loglog", and "semilogy" and "hold on" may appear in your code. In order to show the plot properly, "hold on" can only appears BEHIND "loglog" or "semilogy" to maintain the axis in logarithm scale.

===================================bonus===================================

8. [Figure 8] Download "quiz2.mat" to your computer, and load it into matlab using "load('quiz2.mat') ". The array T contains the time point corresponding to an object's vertical position recorded in Y-array. The unit of t and Y are seconds and cm respectively.
   Make a y-t plot to illustrate the temporal changes of the object.

9. [Figure 9] Generate a $v_y - t$ plot based on prob.8, and explain how you do it.

10. [Figure 10] Generate a $a_y - t$ plot based on prob. 8, and explain how you do it.

11. According to Figures 8-10, what kind of motion will you describe of the object? How do you find when the object reaches its topmost place and how high it is?