MATLAB Programming NYCU Fall 2022 Assignment#1 due 2022/10/21

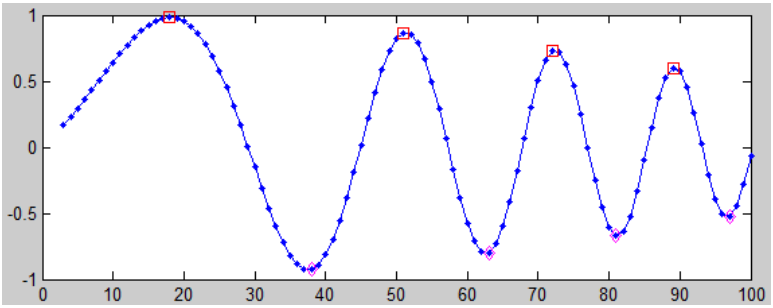
In this assignment, your task is to write a script that divides a series of numbers into segments. Each segment is either monotonically increasing or decreasing. In other words, the segments are separated by local maximums and local minimums.

- First, create a series of numbers. A simple example is

```
x = 3:100;  y = sin(.05*x + .002*x.^2) .* (1 - x.*x/20000);
```

- Find the local maximums and local minimums. An `x` is a local maximum if and only if **y(x)>=y(x-1)** and **y(x)>=y(x+1)**. A local minimum is defined similarly. You can exclude the two end-points. Use `find` to find these local maximums and local minimums. List them in **(x,y)** pairs using `fprintf`.
- Print out the lists of monotonically increasing and monotonically decreasing segments. For each segment, just show the **x** values of its end-points, which are either one of the locally maximum or minimum, or an end-point of the whole series of numbers.
- Finally, plot the **(x,y)** points of the whole series of numbers. In addition, mark the local maximums and local minimums with additional plots.
- This task should be completed <u>without using any loops</u> except for the part of text output. (Note: The `fprintf` part can be made to work without loops as well. Although not required in this assignment, you can try to implement the text output without loops. This approach will speed up the output of large text files.)
- For the example given above, the expected text outputs and plot are given below:

```
Local maximums:
  ( 18,  0.98)
  ( 51,  0.87)
  ( 72,  0.73)
  ( 89,  0.60)
Local minimums:
  ( 38, -0.93)
  ( 63, -0.80)
  ( 81, -0.67)
  ( 97, -0.53)
Monotonically increasing segments:
   3 -  18
  38 -  51
  63 -  72
  81 -  89
  97 - 100
Monotonically decreasing segments:
  18 -  38
  51 -  63
  72 -  81
  89 -  97
```



<u>Submission</u>: Submit your code (m file) through E3. Name your file **`P1_#######.m`**, where the **`#######`** represents your student ID. There will be a three-day grace period after the due date, during which there will be a 10%/day deduction for your grade.

A "copy detection" will be applied to your submissions, and those found to have copied assignments will receive zero points for the assignment.

Your code should include sufficient comments. This will be part of the grade. Include your name and ID at the top of your code.

There will be demo session with the TAs (date/time to be announced later).