Due in 2 weeks!

Instructions: Create script or function files as directed. To turn in:

- Your answers to #2 with the score sheet stapled on top
- Copies of the plots (saved as JPG files and emailed).
  Save each plot as `hw4_1.jpg, hw4_2c.jpg,` etc.
  Also, title each plot of the form "Assignment 4, #1", etc.
- your m-files, both function and script files (emailed)

The JPG and .m files should be emailed with MATLAB HW4 as the subject line.

1. **Piecewise Functions**

   Consider the function:

$$f(x) = \begin{cases} 4e^{x+2} & -6 \le x < 0 \\ x^2 & 0 \le x \le \pi \\ \cos x & \pi < x \le 6. \end{cases}$$

   (a) Write a function called `hw4_1a.m` that computes $f(x)$ for an input. Make sure that x can be a number, vector or matrix and the computations are done component-wise. If an input outside of the domain in input, an appropriate error should be given.

   (b) Write a script file, called `hw4_1b.m` to plot the function using the function above.

2. **Taylor Polynomials**

   (a) Write a function named `taylorexp.m` that takes as input a natural number n (check it!) and a number, or vector x (check it!). If P_n is the n-th Taylor Polynomial for e^x at $a = 0$, (otherwise known as the Maclaurin Polynomial for e^x), the function should return the computed value(s) $P_n(x)$.

   (b) Use your above function to estimate e using $n = 2, 5$ and 10. Write down the answers (interpret the MATLAB output appropriately). (no script file needed)

   (c) Plot $y = e^x$, P_2, P_5 and P_{10} on the same graph for $x \in [-5, 5]$. Make sure that you make a difference between the curves and label them appropriately. Limit the values on the y-axis to between 0 and 10. The script file to create this graph should be called `hw4_2c.m`

   (d) Make another plot of the same curves but for $x \in [-1.5, 1.5]$ and name the script file for this `hw4_2d.m`

   (e) Based on the graphs, what can you say about what happens to P_n as n gets larger (in relation to $f(x) = e^x$?

   (f) Based on the graphs, what would you need to do to use your function to estimate e^x accurately for x far away from 0?