Math 4355
Matlab Homework #D

You may work either solo or in a group of two. If you work in a group of two, each student must upload their own report into eLearning and you must list both names at the top of the report and briefly state who did what.

Turn in a *single pdf file* containing a print out of your code and the numerical results you obtained by running the code to answer the questions below. Make sure your code is commented well enough so that you will understand it in two month's time.

Given a user-defined function, $f : [-\pi, \pi] \to \mathbb{R}$ and an $n \in \mathbb{N}$, write a matlab function that does the following:

1. Computes the Fourier coefficients, a_k for $k = 0, \cdots, n$ and b_k for $k = 1, \cdots, n$, of f using numerical integration. (I recommend the matlab function integral.)

2. Plots the n-th partial sum of the Fourier series and the periodic extension of the function, f on the same axes over the interval $[-3\pi, 3\pi]$.

Then

1. Test your code on three 2π-periodic, piecewise C^1 functions of your choosing.

2. Use your code to investigate the Gibb's phenomenon. In particular, confirm the 9% overshoot at each jump discontinuity of f.