PHYS 103 – Spring 2019

Homework 6

Due on Tuesday 05/28 by 6 PM in box outside Daly 312

1. Problem 5.4

2. Problem 5.6 (Take a constant error bar $\sigma = 1$. You need to predict the Dow Jones Average for the sixth day for each polynomial. Include the data points in the plots)

3. Problem 5.12 (The two datasets are provided as txt files in the textbook's zip file. You should use the 'load' function to get them into your workspace).

4. Problem 6.6. Instructions: Have your program evaluate the solution of the method of images in parts (a) and (b). For part (c) use N=61, and $\tau = 10^{-4}$. For both initial conditions provide a contour plot of $T(x,t)$ and a regular plot of $T(x,t=0.015)$ vs. *x,* in which you compare the numerical results to the results of the method of images. How many images are needed?

5. Problem 6.7. Follow the same instructions as for the previous problem.

6. **Bonus question:** Problem 6.9. Instructions: Apply Dirichlet boundary conditions. Provide mesh and contour plots for three values of τ: $\tau = 1.5\times10^{-4}$ (with 200 time steps), $\tau = 5\times10^{-5}$ (with 600 time steps), and $\tau = 5\times10^{-6}$ (with 6000 time steps). Use N=61 grid points for all cases. Apply the von Neumann stability analysis to the DuFort-Frankel scheme and show that it is unconditionally stable. Notice that you will have a quadratic equation for ξ.