Assignment 6:
Fourier Series and Strings

Due: March 4, 2022 (Friday) **Marks: 15**

1 Solving the plucked and struck string problems

(a) Below you have an initial condition with your name on it for a string of unit length fixed at both ends. Find the solution as a function of time. As we saw in class, this involves computing the Fourier coefficients. Choose the height of each disturbance to be anything you want. Two different types of initial conditions are shown, with disturbances being applied to the displacement (keeping the velocity zero), or to the velocity (keeping the displacement zero). **[5]**

(b) Once the coefficients have been obtained, plot the solution on Python, producing an animation like the one shown in the last Discussion Session. The code file that I used in the last class to create the animation will be shared with you. You can be inspired by it, but don't copy it line-by-line. **[10]**

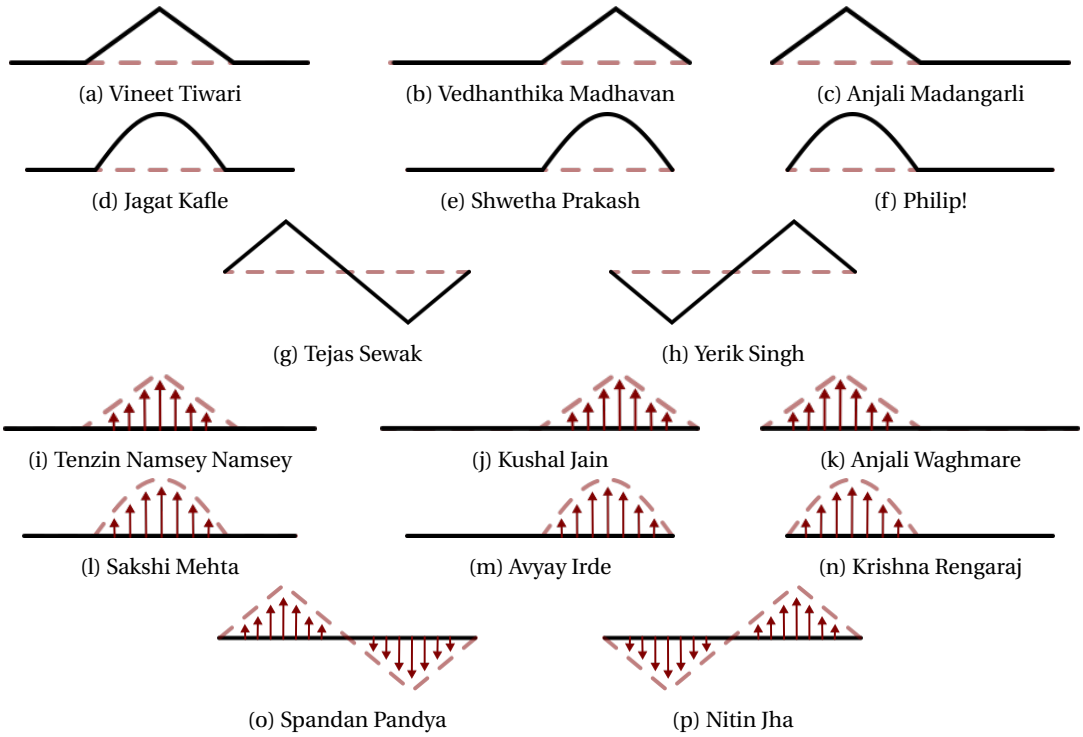

Figure 1: Figures (a) – (h) show conditions on the initial displacement profile of the string, keeping its initial velocity zero, while Figures (i) – (p) show conditions on the initial velocity profile keeping the initial displacement zero. The curved shapes are half-sine functions. In each case, the string is divided into equal intervals (either halves or quarters depending on the problem). Use any coordinate system you want.