

Spring, 2008 Theoretical Seismology (GEOP 523)  
Homework 2; Due 2/27/08

January 25, 2008

1) a. A string of length  $l$ , fixed at both ends, is plucked so that its initial velocity is zero and its initial shape is

$$h \sin\left(\frac{2\pi x}{l}\right) \quad (0 \leq x \leq l) \quad (1)$$

where  $h \ll l$ .

Plot the successive shapes of the string over one fundamental period,  $T$ , in increments of  $T/8$ .

b. Produce a similar set of plots, except for an initial shape of:

$$2hx/l \quad (0 \leq x \leq l/2) \quad (2)$$

$$2h(l-x)/l \quad (l/2 \leq x \leq l) . \quad (3)$$

Hint: Use standing wave and/or Fourier series concepts.

c. Explain, and give mathematical expressions to show, why the modeling of this system becomes much more complicated when  $h$  is not much smaller than  $l$ .

d. Fun extra credit – make a Matlab movie showing the time evolution of your synthetic string-o-grams.