## EXTRA PROBLEMS FOR HOMEWORK 8

Consider the following initial boundary value problem for the wave equation for t > 0and 0 < s < L:

$$y_{tt} = c^2 y_{ss}$$
  
 $y(0,t) = 0 = y(L,t)$   
 $y(s,0) = f_1(s)$   
 $y_t(s,0) = f_2(s).$ 

- **1.** For the case when  $f_1(s)$  is a function whose graph is an isosceles triangle of width L and height h and  $f_2(s) = 0$  find y(s,t) for s = 0.25L and 0.5L and for times ct = 0, 0.2L, 0.4L, 0.8L, 1.4L.
- **2.** Let y(s,t) be the solution for the case  $f_1(s) = 0$  and

$$f_2(s) = \begin{cases} 0, & 0 < s < 0.4L, \\ 5c, & 0.4L < s < 0.6L, \\ 0, & 0.6L < s < L. \end{cases}$$

Sketch y(s,t) as a function of s for times ct = 0, 0.2L, 0.4L, 0.5L, L, 1.2L.

**3.** Sketch the solution y(s,t) at times ct = 0, 0.1L, 0.3L, 0.4L, 0.5L, 0.6L, if  $f_2(s) = 0$  and

$$f_1(s) = \begin{cases} 0, & 0 < s < 0.4L, \\ 10h(s - 0.4L), & 0.4L < s < 0.5L, \\ 10h(0.6L - s), & 0.5L < s < 0.6L, \\ 0, & 0.6L < s < L. \end{cases}$$

1