## EXTRA PROBLEMS FOR HOMEWORK 8

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

$$
\begin{aligned}
y_{t t} & =c^{2} y_{s s} \\
y(0, t) & =0=y(L, t) \\
y(s, 0) & =f_{1}(s) \\
y_{t}(s, 0) & =f_{2}(s) .
\end{aligned}
$$

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 $s=0.25 L$ and $0.5 L$ and for times $c t=0,0.2 L, 0.4 L, 0.8 L, 1.4 L$.
2. Let $y(s, t)$ be the solution for the case $f_{1}(s)=0$ and

$$
f_{2}(s)= \begin{cases}0, & 0<s<0.4 L \\ 5 c, & 0.4 L<s<0.6 L \\ 0, & 0.6 L<s<L\end{cases}
$$

Sketch $y(s, t)$ as a function of $s$ for times $c t=0,0.2 L, 0.4 L, 0.5 L, L, 1.2 L$.
3. Sketch the solution $y(s, t)$ at times $c t=0,0.1 L, 0.3 L, 0.4 L, 0.5 L, 0.6 L$, if $f_{2}(s)=0$ and

$$
f_{1}(s)= \begin{cases}0, & 0<s<0.4 L \\ 10 h(s-0.4 L), & 0.4 L<s<0.5 L \\ 10 h(0.6 L-s), & 0.5 L<s<0.6 L \\ 0, & 0.6 L<s<L\end{cases}
$$

