Math 442, Fall 2007: HW 5

Due date: 10/5/07

1. 3.3 (1,2)

2. (Plucked string with reflection) Consider

\[ v_{tt} - v_{xx} = 0 \quad 0 < x < \infty, t > 0 \]
\[ v(0, t) = 0 \]
\[ v(x, 0) = \phi(x) \]
\[ v_t(x, 0) = 0 \]

where

\[ \phi(x) = 2(1 - |x - 2|) \quad |x - 2| < 1 \]
\[ = 0 \quad |x - 2| \geq 1 \]

Solve and sketch the solution for \( t = 1, 2, 3 \).

3. (Hammer blow with reflection) Consider

\[ w_{tt} - w_{xx} = 0 \quad 0 < x < \infty, t > 0 \]
\[ w(0, t) = 0 \]
\[ w(x, 0) = 0 \]
\[ w_t(x, 0) = \psi(x) \]

where

\[ \psi(x) = -2 \quad |x - 2| < 1 \]
\[ = 0 \quad |x - 2| \geq 1 \]

Solve and sketch the solution for \( t = 1, 2, 3 \).