

Instructions: Work the following problems and submit your solutions at the beginning of class on Wednesday, April 8, 2009. You may use any resources you like, but the solutions you submit must be solutions that you, yourself, have written from the understanding that you have gained from the resources you use. If I have doubts about your understanding of a solution you have presented, I may ask you to come to my office and elaborate it orally.

1. Work Problem 1 of Lesson 18.
2. Solve the semi-infinite string problem:

$$\begin{aligned}u_{tt} &= c^2 u_{xx}; & 0 \leq x < \infty, 0 < t < \infty \\u(0, t) &= \sin t; & 0 < t < \infty \\u(x, 0) &= 0; & 0 < x < \infty \\u_t(x, 0) &= 0; & 0 < x < \infty.\end{aligned}$$

3. Solve the IBVP associated with the *hammered string*:

$$\begin{aligned}u_{tt} &= c^2 u_{xx}; & -L \leq x \leq L, 0 < t < \infty \\u(x, 0) &= 0; & 0 < t < \infty \\u_t(x, 0) &= \begin{cases} 0, & \text{when } \frac{L}{10} < |x| \\ 1, & \text{when } |x| \leq \frac{L}{10}; \end{cases} \\u(-L, t) &= 0; & 0 < t < \infty \\u(L, t) &= 0; & 0 < t < \infty.\end{aligned}$$