

Math 112A — Homework 3

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Reading: Sections 2.1 and 2.2. In Section 2.1, you definitely need to know how to derive the solution of the wave equation, as well as d'Alembert's formula. In Example 2, just assume $a = b = c = 1$. In Section 2.2, assume $\rho = 1$ and $T = 1$, and ignore the discussion after Example 1. In lecture, I will show you an alternative way of doing the energy method, which you may or may not like more.

- **Section 2.1:** 1, 8, 9, 10, AP1, AP2
- **Section 2.2:** 1, 2, 5 (1.3.3 = equation (3) in 1.3)

Additional Problem 1: Show that if $u_{tt} = c^2 u_{xx}$ and $\xi = x - ct$ and $\eta = x + ct$, then

$$u_{tt} = c^2(u_{\xi\xi} - 2u_{\xi\eta} + u_{\eta\eta})$$

Additional Problem 2: In Example 2 in section 2.1 (The Plucked String) with $a = b = c = 1$, draw a picture of $u(x, 1)$ (so $t = 1$) and explain how you got your answer. You'll need to argue in 6 cases this time: $x < -2$, $-2 < x < -1$, $-1 < x < 0$ etc.