

Math 442 — Day 3 Worksheet

Material: Section 1.3

1. Page 11 Example 2 — Vibrating String.

Where should the derivation in this example be changed, in order to end up with the equations in variations (i), (ii) and (iii) at the bottom of page 12?

2. Page 14 and 15 — Heat Flow in 1 dimension.

Derive the 1D heat equation $\boxed{c\rho u_t = (\kappa u_x)_x}$. Hint. You want to modify Example 5 to hold in one dimension instead of three dimensions. Start by defining

$$H(t) = \int_{x_0}^{x_1} c\rho u(x, t) dx$$

and then argue like in Example 4. Be sure to clearly state what Fourier's Law says, at x_0 and x_1 .