

### Exercise 1.2.6

Suppose that the specific heat is a function of position and temperature,  $c(x, u)$ .

- (a) Show that the heat energy per unit mass necessary to raise the temperature of a thin slice of thickness  $\Delta x$  from  $0^\circ$  to  $u(x, t)$  is not  $c(x)u(x, t)$ , but instead  $\int_0^u c(x, \bar{u}) d\bar{u}$ .
- (b) Rederive the heat equation in this case. Show that (1.2.3) remains unchanged.