

18.152: Fall 2010

Homework 7

Available	Tuesday, November 9	Due	Tuesday, November 16
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Turn in the homework at the beginning of class on Tuesday, November 16. No late homework is accepted unless previously arranged with the instructor.

This week homework will cover old material and new material from page 221–240.

1. Problem 5.1 in textbook.

Hint: In the derivation assume that τ_0 and ρ_0 are both constant. Also note that the initial data $u(x, 0)$ of this problem is singular at $L/2$, but still use separation of variables to formally find the solution $u(x, t)$.

2. Problem 5.2 in textbook.

3. Problem 5.3 in textbook.

4. Problem 5.4 in textbook.

Hint: First write the solution u using the d'Alembert formula:

$$u(x, t) = F(x + ct) + G(x - ct).$$

Then write the potential energy E_{pot} and the kinetic energy E_{cin} in terms of $F'(x + ct)$ and $G'(x - ct)$ and compare them. The only thing you need to pay attention to is the support of $F'(x + ct)$ and $G'(x - ct)$.