Problem Set #10
Physics 302

Thursday, 25 April 2024

The following problems come from *Vibrations and Waves* (1971), by A. P. French.

- Problem 6-5 on page 197 ⇒ (*15 points*) Find $y(x,t)$ using the boundary conditions described in the problem statement. Note that the string's mass is M (not m), and you are looking for the smallest possible value of ω (not w).
- Problem 6-6 on page 197 ⇒ (*20 points*) Read the top of page 173 very carefully. Think about what it means for the end at $x = L$ to be free of stress. Think, too, about that fact that clamping the rod at the center means there is a *node* at the center, no matter the mode. Part (c) is a little tricky, and the back-of-the-book answer is somewhat wacky. You will need to determine how many nodes there are in the n^{th} mode. That number obviously depends on n. Your answer for the location of the nodes will have the notation of $x_k^{(n)}$, where n is the mode number and k is the integer representing the k^{th} node.
- Problem 6-12 on page 199 ⇒ (*10 points*) Use the results we obtained in class for Problem 6-11, specifically the equations for dK and dU.
- Problem 6-14 on page 199 ⇒ (*15 points*) If you use *Mathematica* or integration tables, please turn in a copy of your code or provide a reference.

Due date: **Monday, 06 May 2024** (*beginning of class*)