

PHYS 2601 (Fall 2025): Problem Set 6

Due date: October 28, 9:00am. 50% penalty on late homework.

From Vibrations and Waves (King)

Problem 5.2 (5 pts)

Problem 5.3 (10 pts)

Problem 5.6 (5 pts)

From Vibrations and Waves (French)

Problem 7-8 (5 pts)

7-8 Two points on a string are observed as a traveling wave passes them. The points are at $x_1 = 0$ and $x_2 = 1$ m. The transverse motions of the two points are found to be as follows:

$$y_1 = 0.2 \sin 3\pi t$$

$$y_2 = 0.2 \sin(3\pi t + \pi/8)$$

(a) What is the frequency in hertz?

(b) What is the wavelength?

(c) With what speed does the wave travel?

(d) Which way is the wave traveling? Show how you reach this conclusion.

(Warning! Consider carefully if there are any ambiguities allowed by the limited amount of information given.)

Problem 7-13 (10 pts)

7-13 A pulse traveling along a stretched string is described by the following equation:

$$y(x, t) = \frac{b^3}{b^2 + (2x - ut)^2}$$

(a) Sketch the graph of y against x for $t = 0$.

(b) What are the speed of the pulse and its direction of travel?

(c) The transverse velocity of a given point of the string is defined by

$$v_y = \frac{\partial y}{\partial t}$$

Calculate v_y as a function of x for the instant $t = 0$, and show by means of a sketch what this tells us about the motion of the pulse during a short time Δt .

In your solutions, please provide written comments (in addition to the math) that show your reasoning to receive full credit.

Please submit solutions electronically as a single merged pdf document to gradescope (handwritten or typeset) and tag all problems, otherwise a penalty will be applied.