

# PHYS 452 Homework

## Chapter 7

Name: \_\_\_\_\_

Problem 1 \_\_\_\_\_

Problem 2 \_\_\_\_\_

Problem 3 \_\_\_\_\_

Problem 4 \_\_\_\_\_

Total \_\_\_\_\_

**Directions:** Work as many of the problems as you can and return the problem set when you are finished. Remember, you are to work *independently* on these problems.

You are encouraged to either type your work directly into this form, or to print the form, write your answers on the printed copy, scan and attach to a return email. Either way works for me.

If, however, you are a luddite or (some other form of technophobe) you may just drop it by my office in Pocatello, hand it to me in class, or snail mail it. Any method of delivery that gets it in my hands by the due date is fine.

Best of luck!

**Problem 1.** Two waves traveling together along the same line are given by:

$$y_1 = 5 \sin\left(\omega t + \frac{\pi}{2}\right)$$

$$y_2 = 7 \sin\left(\omega t + \frac{\pi}{3}\right)$$

Find the resultant.

**Problem 2.** Two plane waves of the same frequency and with vibrations in the z direction are given by:

$$\psi(x,t) = 4 \sin \left[ 20t + \left( \frac{\pi}{3} \right) x + \pi \right]$$

$$\psi(x,t) = 2 \sin \left[ 20t + \left( \frac{\pi}{4} \right) y + \pi \right]$$

write the resultant wave equation at  $(x, y) = (5, 2)$ .

**Problem 3.** Plot and write the equation of the superposition of the following harmonic waves:

$$E_1 = \sin(\omega t - 10^\circ)$$

$$E_2 = 3 \cos(\omega t + 100^\circ)$$

$$E_3 = 2 \sin(\omega t - 30^\circ)$$

where the period of each is 2s.

**Problem 4.** The dispersion curve of glass can be approximated by Cauchy's empirical equation. Find the phase and group velocities for 550 nm light in a particular glass for which the Cauchy A constant is 1.40 and the B constant is  $2.5 \times 10^6 \text{ \AA}^2$ .