

## PHYS 211 Homework Assignment

### Chapter 16

**Problem 1** Describe the difference between a transverse and a longitudinal wave. Give examples of each.

**Problem 2** A transverse traveling wave on a cord is represented by  $D = 0.22 \sin(5.6x + 34t)$ , where  $D$  and  $x$  are measured in meters and  $t$  in seconds. Find:

- (a) the wavelength,
- (b) the frequency,
- (c) the velocity,
- (d) the amplitude,
- (e) maximum and minimum speeds of a particle in the cord

**Problem 3** A 524 Hz longitudinal wave in air has a speed of 345 m/s.

- (a) What is its wavelength?
- (b) How much time is required for the phase to change by  $90^\circ$  at a given point in space?
- (c) At a particular moment in time, what is the phase difference between two points 4.4 cm apart?

**Problem 4** Two waves of identical wavelength  $\lambda$  and amplitude  $A$  travel along a common string.

- (a) At what phase difference does their superposition create a new wave with amplitude  $1.5A$ ?
- (b) If the phase difference is  $\pi/2$ , what is the new amplitude?
- (c) If the two waves are traveling in opposite directions, what will happen?

**Problem 5** A 15 g guitar string is held under a tension of 300 N with a length of about 2 ft. The string is plucked at one end ( $x = 0$  ft) at  $t = 0$  s. 2 ms later, the string is plucked from the other end ( $x = 2$  ft). The two pulses propagate along the string.

- (a) Where do they meet?
- (b) If the tension is doubled, where do they meet?
- (c) If a 30 g string is used at 300 N, where do they meet?