Physics 1135: Homework #27: Waves

1. A traveling wave is described by the equation $y(x,t) = 3\text{ cm}\sin(2\pi x/2.4\text{m} - 2\pi t/0.2\text{s})$.
Find period, frequency, wave length, wave number, and wave speed.
Is the wave traveling in the positive or negative x-direction?
What is the maximum transverse speed of a particle?

2. A string of mass M and length L is under tension T. A wave on this string has wavelength 8 and amplitude A. Find the maximum transverse speed of a particle on the string.

3. Train A is moving at 30m/s and sounding its whistle which emits sound of a frequency of 280Hz. Train B is traveling in the opposite direction at 20m/s.
a) What frequency is heard by a passenger on train B while the trains are approaching one another?
b) What frequency is heard by a passenger on train B after the trains have passed, and are receding from, one another?

4. The most common bat species in Missouri is the little brown bat which emits ultrasound of a frequency of 45kHz. If a little brown bat is flying towards a cliff wall with a speed of 8.0m/s, what is the frequency of the reflected sound the bat hears?