Mechanical Waves Practice Problems

1) A 90-cm-long guitar string of mass 3.6 g needs to be tuned to the standard A (f = 440 Hz). Assuming the mass is uniformly distributed throughout the length of the string, what should the tension be to obtain the desire tuning?

Note: Sound travels at 343 m/s

2) Manolo is at a really weird party. He is leaning against the wall trying to chill but two speakers on the opposite side of the room 11 m away from him are emitting a high pitch that is killing his vibe. He moves 1.5 m from his original position along the wall to find a spot where he hears almost no sound. If the speakers are 3 m away from each other, what is the frequency of the sound?

3) Glenn is looking to buy a new amplifier for his electric guitar. His options are a 30-W Tube Head and a 100-W Tube Head. He wants to get the one that will provide the loudest sound. Which one should Glenn choose? How much louder will this amp be compared to the other?

4) Clotilda is enjoying a nice day at the beach, floating in the relatively calm waters when she hears something approaching very fast. She quickly dives underwater out of fear of losing her head and when she rises to the surface she notices a jet ski had passed, leaving a trail of waves propagating at a speed of 5 m/s traced by a cone with half-angle of 10^{o} (Very perceptive of Clotilda). Help Clotilda figure out how fast the jet ski was going so she can report it to the authorities.

5) Opera singer Montserrat Caballé wants to be able to shatter a wine glass while traveling in a moving platform. The glass will shatter when exposed to sound of frequency 556 Hz; however, Montserrat is only able to reach a pitch of 538 Hz. What should the velocity of the platform be with respect to the wine glass for Monserrat to succeed in performing this stunt?