Assignment 9
Due: December 1, 2024

1. Suppose you have a string that generates a standing wave. If the left and right-moving travelling waves generating the standing wave each travel at 10 m/s and the frequency of the 3rd harmonic is 12 Hz, what is the length of the string? What is the wavelength of the standing wave? What is the frequency of the first harmonic (also called fundamental frequency)? Draw these two standing waves.

2. Calculate how much energy an electron needs to gain to leave a hydrogen atom if the electron is originally in the 4th excited state. Hint: What is n in this case? Is n=4? Or is it n=5?

3. Suppose you discover a new atom that only has a single electron. The energy levels of the electron are shown below. Suppose you excite the electron to its n=5 energy level. As the electron returns to the ground state, photons are emitted. You don't know whether the electron immediately goes to its ground state or goes to a lower energy level

