

Phys 375 – Tuesday section – Prof. Hall
Homework #5, due October 30, 2007

- 1) Pedrotti, problem 8-1.
- 2) Pedrotti, problem 8-3.
- 3) Pedrotti, problem 8-5.
- 4) Imagine that a Michelson interferometer is oriented so that one arm points in the direction of earth's motion around the sun, and that the other arm is transverse to the earth's motion. The interferometer is illuminated with a He-Ne laser, with wavelength 633 nm, and the length of each arm is one meter. Six hours later, both arms are perpendicular to the earth's motion, because the earth has rotated. If the speed of light for motion parallel to the earth's velocity is $c + v_e$, and the speed of light perpendicular to the earth's motion is simply c , how many fringes should be observed to pass by a detector during the six hours? c is the speed of light in vacuum = 3.0×10^8 m/s, and v_e is the Earth's orbital velocity around the sun = 3.0×10^4 m/s. (In practice no fringe shift is seen because the velocity of light is independent of the frame of reference.)