PHYS 2210 Fall 2010 Homework Set 4

Due at the start of class on **Sept 16, 2010**
Show your work!

1. Taylor 3.8
2. Taylor 3.12
3. Taylor 3.22
4. Astronaut Oblivious has drifted too far away from the space shuttle while attempting to repair the Hubble Space telescope. Oblivious realizes that the orbiter is moving away from him a 3 m/s. Oblivious and his jetpack have a mass of 100 kg, including a pressurized tank of mass 10 kg (which including the mass of the gas and the empty tank). The tank includes only 2 kg of gas, which is used to propel him in space. The gas exits the tank with a constant velocity of 100 m/s.

   a Will Oblivious run out of gas before he reaches the orbiter?

   b With what velocity will he have to throw the empty tank away to reach the orbiter?

5. Two FBI agents (let's call them Mulder and Scully) are investigating the wreckage of the spaceship is in three large pieces around a northern Colorado town. One piece (mass = 300 kg) of the spaceship landed 6.0 km due north of the center of town. Another piece (mass = 1000 kg) landed 1.6 km to the southeast (36 degrees south of east) of the center of town. The last piece (mass = 400 kg) landed 4.0 km to the southwest (65 degrees south of west) of the center of town. There are no more pieces of the spaceship. The Air Force, which was watching the spaceship on its radar, claims it was moving with a constant speed of 5 m/s to the east at a height of 1.96 km. It was 100 m west of the center of town when the spaceship spontaneously exploded and the pieces fell

to the ground. Agents Mulder and Scully think a missile hit it. Are the fragments consistent with the spaceship exploding spontaneously? If not, can you tell what direction the missile came from?