Physics 200 Name: _____

1. Suppose a rocket's thrust lasts for **0.055s**. Immediately after thrust ends, the rocket is **2.4m** above the ground. Its velocity is **56m/s**, upward. Its mass (now that the water is gone) is **0.182kg**. The rocket's drag coefficient is **0.25**, and its cross-sectional area is **0.01m²**. The density of the air surrounding the rocket is **1.27kg/m³**. The rocket does not have a parachute, and its characteristics (drag coefficient and Area) do not change during flight.
    a. Find the rocket's total time aloft
    b. Find the rocket's maximum height
    c. For the moment just before the rocket lands (just before the time you gave as an answer to part a, sketch a diagram showing…
        i. the rocket
        ii. all of the individual forces (and the net force) acting on the rocket
        iii. the net force acting on the rocket
        iv. the rocket's acceleration
        v. the rocket's velocity
    d. For the moment just after thrust ends (t=0.055s), sketch a diagram showing…
        i. all of the individual forces (and the net force) acting on the rocket
        ii. the net force acting on the rocket
        iii. the rocket's acceleration
        iv. the rocket's velocity
2. [*The numbers provided here are estimates, but use them as if they were precise measurements.]* Wiffle® ball has a mass of about **19g** and a diameter of about **7cm**. A baseball has a mass of about **145g** and a diameter of about **7.4cm**. Suppose someone throws each of them directly upward at a speed of **30mph**. Let's assume that they are released from a height of **1.4m**. Let's also assume that they each have a drag coefficient of **0.5**, and that the density of the air surrounding each of them is **1.27kg/m³**…
    a. For the baseball, find…
        i. It's cross-sectional area (in m^2)
        ii. Maximum height reached
        iii. Total time aloft
        iv. Terminal Velocity
        v. Strongest drag force
        vi. Crashdown speed (speed just before landing)
    b. For the Wiffle ball, find…
        i. It's cross-sectional area (in m^2)
        ii. Maximum height reached
        iii. Total time aloft
        iv. Terminal Velocity
        v. Strongest drag force (ignore sign)
        vi. Crashdown speed (speed just before landing)