Lecture F1 Mud: Intro Concepts & Definitions
(40 respondents)

1. **Explain PRS #1** (1 student)
   For a fluids situation to be Hydrodynamic or Aerodynamic in nature, the fluid must be moving relative to an object. In the PRS question, the water does not move past the buoy. So that's an example of Hydrostatics.

2. **Why is $p = \lim \Delta F_n / \Delta A$, and not just F/A ?** (1 student)
   This is just notation convention. The definition is similar to that of a derivative, where ΔA becomes dA in the limit. Later in the course we will write $dF_n = p\, dA$ when integrating all the pressure forces on a wing.

3. **If the observer frame changes, wouldn't $p(x, y, z, t)$ be different functions?** (6 students)
   Very good question. I think I was unclear on what I meant by "same" or "different", both on the PRS question and in the discussion. Yes, the two observers will see different $p(t)$ time traces at each observer's origin $(x, y, z) = (0, 0, 0)$, for example. But at the instant when the two origins cooincide (obesrvers are momentarily on top of each other), the two $p(t)$ values will be numerically equal. Likewise for the two $\rho(t)$ traces. But the $V(t)$ and $p_o(t)$ traces will <u>not</u> be numerically equal.

4. **How can you tell when a scalar field is the same for different observers?** (1 student)
   There's no guaranteed litmus test. You have to look at the physical situation and decide. This is one job of a physicist.

5. **If p_o is a "pressure quantity", why does it depend on the observer, unlike p?** (1 student)
   It's partly because p_o is a somewhat hypothetical quantity which isn't directly measurable at a point, unless you intentionally bring it to rest (drive $V \to 0$). One observer's definition of "at rest" is different from another's. We'll cover this more later.

6. **In which frame will p_o be most useful?** (1 student)
   Great question! In most cases, p_o is most useful in that frame in which the flow is *steady*. It's useful to an observer moving with the airplane (steady flow). It's less useful to a stationary observer who sees the plane fly by (unsteady flow).

7. **No mud** (29 students)