CUSP – Real-world Science Workshop III: Dynamics **October 10, 2002**

For questions about this assignment, please contact: mwong@physics.ucsd.edu

1. Imagine a paper cup with a tiny hole drilled out near the bottom on the side of the cup. Now imagine that you fill it with water and hold it over the sink. What will happen (you may not need to imagine this, as it was done during class)? Explain this starting from Bernoulli's Equation. Now imagine what would happen if you again filled the cup with water and let it drop into the sink. Explain what happens and why.

2. If you have access to the internet, play around with the airfoil simulator on the NASA Education web page, http://www.grc.nasa.gov/WWW/K-12/airplane/foil2.html and report what conditions optimize the lift. The goal here is to find qualitative relationships, not an exact figure. For example, does the altitude of the plane's flight matter? Does the angle of the wing matter? Choose one or two of the variables that you are unfamiliar with and find out what it (or they) refers to.

-OR-

If you don't have access to the internet, plug reasonable numbers into the below equation for the lift of an airfoil to estimate the lift of a wing.

$L = C_{lift}*(0.5)*\rho*V^2*A$, where L is lift, C_{lift} is the lift coefficient (try values between zero and one), ρ is the air density, V is the air velocity past the wing, and A is the wing area.

3. Explain how Bernoulli's Equation (or the special case of Torricelli's Result or the Venturi Effect) relates to one of the exhibits at the Fleet Center. Without going into a lot of mathematics, how would you explain Bernoulli's Equation to a Fleet Center visitor? Use examples from everyday life, if possible.