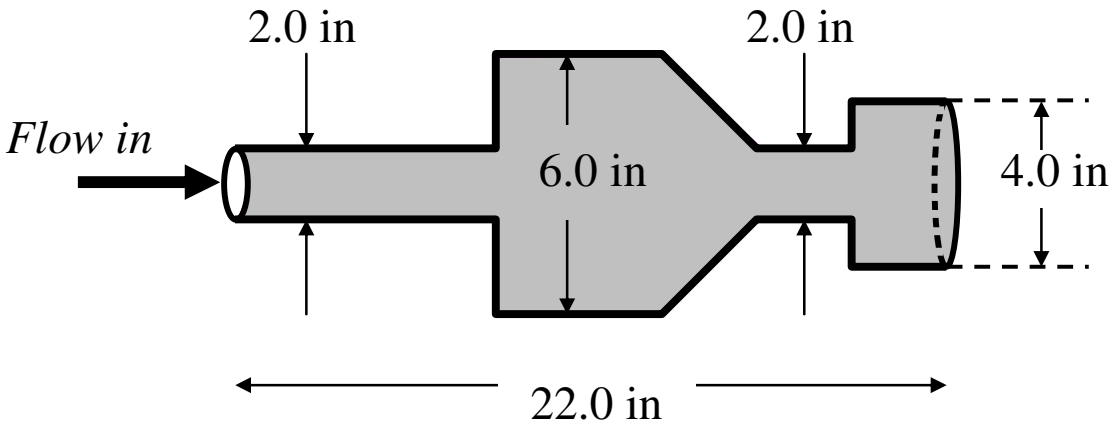
Name:_____.

Mini-Exam II

CM 3110
8 October 2007

Note:
Significant figures count.
Please box your final answers.
Please be neat.

1. (50 points) Blue fluid 175 (density=1.75 g/cm^3, viscosity=8.1cP) flows in the pipe of variable circular cross section sketched below. The flow rate into the pipe is 0.053 *ft^3/s*. What is the average velocity in *ft/s* of the blue fluid at the exit?



2. (50 points) A constant-density, Newtonian fluid is subjected to a steady flow in a parallel-plate apparatus as sketched below. The two long, wide parallel plates are separated by a distance $\boldsymbol{H}$. The top plate is moving with a velocity $\boldsymbol{V_{wall}}$ to the right, as shown. There is a small backwards pressure gradient $-\Delta p / L$ in the x–direction. You may neglect gravity.
    a. For the coordinate system drawn, is the momentum flux $\tau_{yx}(y)$ positive or negative?
    b. What are the boundary conditions on velocity?
    c. What is $\tau_{yx}(y)$ in the fluid? Please indicate your assumptions and show how you arrive at your answer.