

Name: \_\_\_\_\_

Date: \_\_\_\_\_

Collaborators: \_\_\_\_\_

(Collaborators submit their individually written assignments together)

Question:	1	2	Total
Points:	40	40	80
Score:			

Instructor/grader comments:

1. (40 points) A vertical pipe is filled with a viscous incompressible fluid with the density  $\rho$  and viscosity  $\nu$ . A long light cylinder (its density is much less than  $\rho$ ) of radius  $R$  and length  $L$ , ( $L \gg R$ ) is immersed co-axially into the pipe so that only a small gap of width  $h \ll R$  is formed between their lateral surfaces. Find the terminal velocity of the cylinder.
2. (40 points) A heavy viscous fluid flows down a vertical wall under the influence of gravity. Assuming that initially the fluid was spread uniformly over the wall (up to a finite height), find the thickness of the film of the fluid,  $\delta$ , as a function time and the height:  $\delta = \delta(x, t)$ . Consider the limit of large times when  $\delta(x, t) = f(x)T(t)$ .