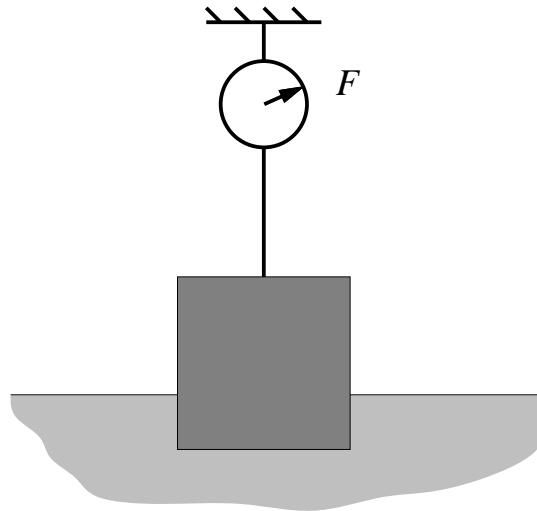1. (50 %) A solid plastic cube is suspended from a sensitive force scale, while being partially dipped in an effectively infinite pool of liquid.

a) List the set of physical parameters which influence the force F that the scale reads. Do not make any approximations if you don't have to.
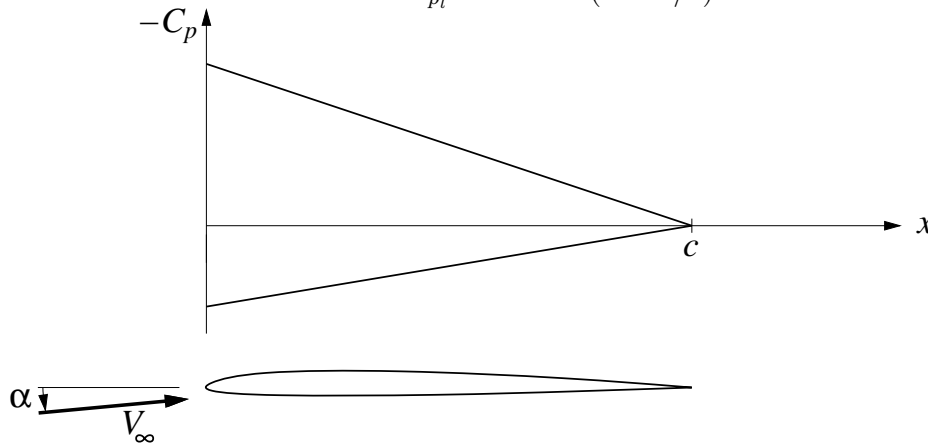
$$F = f(\ldots? \ldots)$$

b) Determine a complete set of nondimensional parameters (or Pi products) which fully describe this situation.

2. (50 %) A thin airfoil is measured to have the following linear C_p distributions on its upper and lower surfaces at some small angle of attack α.

$$
\begin{aligned}
C_{p_u} &= -1.0\,(1 - x/c) \\
C_{p_l} &= 0.5\,(1 - x/c)
\end{aligned}
$$

a) Determine the lift coefficient c_ℓ. You may assume that $\alpha \ll 1$.

b) Determine the moment coefficient $c_{m_{c/4}}$ about the quarter-chord location $x = c/4$.

c) Determine center of pressure location x_{cp}.