

A thin airfoil of chord  $c = 1.0$  m has the following quadratic variation of pressure on both the top and bottom surfaces when operating at  $\alpha = 5^\circ$ .

$$p_u(x) = p_\infty + p_{u_0}(1 - x/c)^2$$

$$p_\ell(x) = p_\infty + p_{\ell_0}(1 - x/c)^2$$

$$p_\infty = 100000 \text{ Pa}$$

$$p_{u_0} = -1000 \text{ Pa}$$

$$p_{\ell_0} = 500 \text{ Pa}$$

- a) Determine the lift/span  $L'$ , moment/span  $M'_{c/4}$ , and center of pressure  $x_{cp}$ .
- b) This operating condition corresponds to  $c_\ell = 1.0$ . What must be the airfoil's flight speed in sea level air? ( $\rho_\infty = 1.225 \text{ kg/m}^3$ )