1) A thin, metal cylindrical shell of radius R and length ℓ carries a total charge Q. The cylindrical shell's central axis is along $\hat{z}$. A concentric metal cylinder with a radius less than R and length ℓ also carries a charge of Q. Assume $\ell \gg R$ throughout. Write all answers in terms of Q, ℓ, R and physical/mathematical constants as needed.

(a) Compute the surface charge on the outside (σ_O) and inside (σ_I) of the cylindrical shell. Start by computing $\vec{E}$ just outside and just inside of the cylindrical shell.

(b) Find the pressure on the inside and outside surfaces of the cylindrical shell.

(c) Integrate your pressure expressions to find the total F_y on the $y > 0$ half-cylinder.