2. Capacitor ***(6 points)*** An ideal plate capacitor has plates with area A and separation d and is charged so that the electric field between the plates equals to E.

i) (2 pts) Find the energy density of the electric field inside the capacitor and the total energy of the field.

ii) (1.5 pts) What is the force required to keep the plates separated?

iii) (2.5 pts) Now, this capacitor is submerged into distilled water of dielectric permittivity $\varepsilon = 80$; the electric field between the plates equals still to E. What is the hydrostatic pressure between the plates if the atmospheric pressure is p_0 and the pressure of the water column can be neglected?