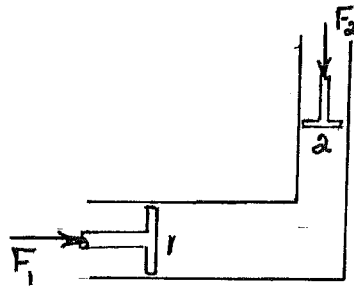1.1 A force $F_1 = 500,000N$ acts on the piston at 1 whose area is $A_1 = 6cm^2$. For equilibrium what is the force acting on the piston at 2 if its area is $A_2 = 2cm^2$? Neglect gravity.

1.2 Water at the surface of a lake is at a pressure of $101,000N/m^2$ and temperature of 15^0C. If the density there is $998kg/m^3$, what is the density at a depth of 100m where the pressure is $1,081,000N/m^2$ and temperature -5^0C?

1.3 Air $(R = 287N \cdot m/kg \cdot ^0K)$ on the left of the movable partition has a density $\rho = 8.0kg/m^3$ and a temperature $T = 15^0C$. Carbon dioxide $(R = 189N \cdot m/kg \cdot ^0K)$ is on the right side of the movable partition at a temperature of $T' = 15^0C$. For equilibrium what is the pressure and density in the carbon dioxide?