1) The system shown consists of a slender bar $AB$ of mass $m$ and length $\ell$ and a piston $P$ of mass $m_p$. A spring and damper are attached to the light slider at $B$. The spring is unstretched when $x = 0$. Find the vertical force $F_0$ (applied to the piston) required to hold the bar at some non-zero angle $\theta$. Include the effects of gravity and neglect friction. Use $\theta$ as the generalized coordinate.

2) The system shown consists of two pin-connected slender links each of mass $m$ and length $\ell$. The links are held in place by the weights of the two bars and the horizontal force $P$. Find the equilibrium angles $\theta_1$ and $\theta_2$ in terms of the applied force $P$. Use $\theta_1$ and $\theta_2$ as the generalized coordinates.