# Intermediate Dynamics
Exercises #8a – Use Principle of Virtual Work

1) The system shown consists of **slender bar** AB of mass m and length ℓ 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 θ. Include the effects of **gravity** and **neglect friction**. Use θ as the generalized coordinate.
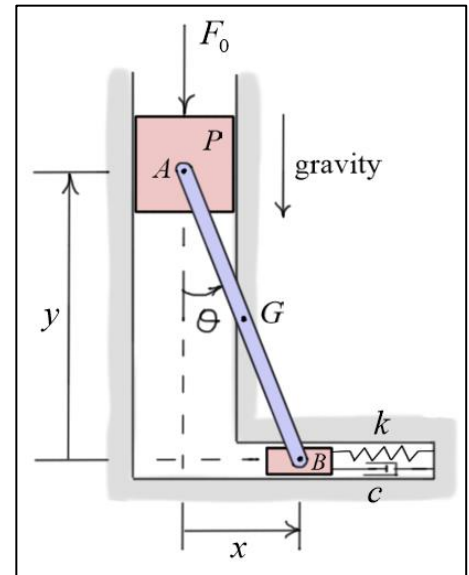
2) The system shown consists of two pin-connected slender links each of mass m and length ℓ. The links are held in place by the weights of the two bars and the horizontal force P. Find the equilibrium angles θ_1 and θ_2 in terms of the applied force P. Use θ_1 and θ_2 as the generalized coordinates.