Problem 3. A small charged ball of mass m and charge q is suspended from the highest point of a ring of radius R by means of an insulating cord of negligible mass. The ring is made of a rigid wire of negligible cross section and lies in a vertical plane. On the ring there is uniformly distributed charge Q of the same sign as q. Determine the length l of the cord so as the equilibrium position of the ball lies on the symmetry axis perpendicular to the plane of the ring.

Find first the general solution a then for particular values $Q = q = 9.0 \cdot 10^{-8}$ C, $R = 5$ cm, $m = 1.0$ g, $\varepsilon_0 = 8.9 \cdot 10^{-12}$ F/m.