A massless rod of length $L$ rotates clockwise at constant rate in a **vertical circle** about its center $C$ near the surface of the earth. A frictionless ring of mass $M$ has slid freely on the rod until it reached an endcap which prevented the ring from sliding off. The rod is rotating fast enough that the ring is always in contact with the endcap. The ring has constant speed $V$.

a) Derive an algebraic expression for the magnitude of force that the **endcap** (not the rod) exerts on the ring when the rod makes an angle $\theta < 90^\circ$ past the downward direction as shown, in terms of relevant system parameters.

b) Derive an algebraic expression for the magnitude of force that the **rod** (not the endcap) exerts on the ring when the rod makes an angle $\theta < 90^\circ$ past the downward direction, in terms of relevant system parameters.