

## Section 6.A - bonus question #1

**Given:** A homogeneous circular disk (having a mass of  $m$  and outer radius of  $R$ ) is pinned to ground with a smooth pin at  $O$ . An inextensible cable is wrapped over the outer surface of the disk. One end of the cable supports block  $A$  (of mass  $2m$ ), and the other end of the cable  $B$  is connected to ground with a spring of stiffness  $k$ , as shown below. Assume that the cable does not slip on the disk and that the cable remains taut for all motion. Let  $\theta$  describe the rotation of the disk, and let the spring be unstretched when  $\theta = 0$ .

**Find:** For this problem, derive the differential equation of motion for the system in terms of the  $\theta$  coordinate.

