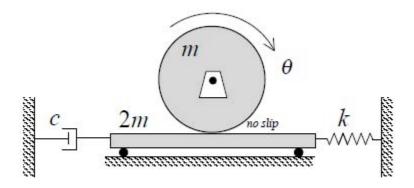
## Homework H.6.B

Given: A homogeneous drum (of mass m and radius R) is pinned to ground at its center. The drum rolls without slipping on a block of mass 2m, with the block, in turn, being able to slide on a smooth horizontal surface. A dashpot and a spring are attached between the block and ground, as shown in the figure. Let  $\theta$  represent the rotation of the drum, and  $\theta = 0$  represent the state where the spring is unstretched.

## **Find:** For this problem:

- (a) Draw individual free body diagrams of the drum and block; and
- (b) Derive the single differential equation of motion (EOM) for the system in terms of the coordinate  $\theta$ , its time derivatives, and, at most, the following parameters: m, c, R, and k.



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