ME EN 534
Homework #6

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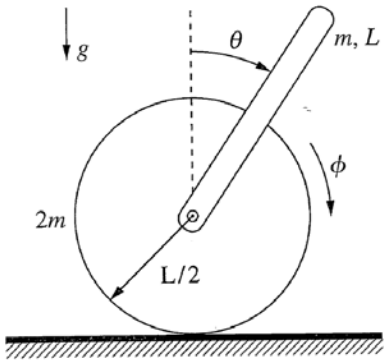
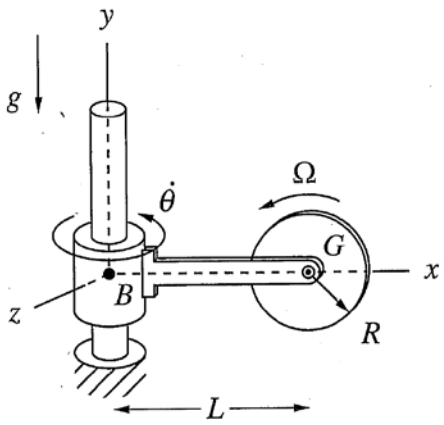
1. A bar of mass m and length L is connected to a disk of mass $2m$ and radius $R = L/2$. The assembly is released from rest with $\theta = 30^\circ$. Given that friction between the disk and the surface is sufficient to prevent slipping, find the angular acceleration of the disk at this instant. Use Newton-Euler methods.



2. Complete Problem 11.13 from the text. Find (1) the equation of motion in terms of θ and (2) the reaction forces at B. Express the reaction forces in the $b_1 b_2 b_3$ frame shown in the figure. The problem states that you should use Equations (11.43)-(11.46) to solve the problem, but you can use any form of the moment-momentum equation that you like.

3. The disk of mass m and radius R is being held by a massless bar of length L. The disk rotates with a constant angular velocity Ω about point G. The bar and disk rotate about a vertical shaft at B. Find the external moments at B about the xyz axes, which are attached to the bar (not the vertical shaft).



4. The rectangular plate is attached to a massless rod, which spins with constant angular velocity Ω under the action of applied moment M. Find the reactions at the supports A and B, assuming self-aligning bearings. Use a body-fixed coordinate frame with the x axis directed along the rod and to the right, and with the y axis directed as shown. The 30° angle is in the x-z plane.